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FIRST AID TO THE INEXPERIENCED—VIII

Art and Mechanical Drawing in Relation to Shop Work

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JUST as mechanical processes and methods of construction are made clear by demonstrations, so ideas of form, proportion, and structural relations are clarified, defined, and made permanent by drawing. A piece of constructive work is the embodiment of an idea or ideas in material form, and drawing is the means by which the idea is defined to oneself and transmitted to others. Drawing, both freehand and mechanical, is an absolutely essential means of expression by which ideas of form, proportion, and structural relations are conveyed and rendered appreciable.

In drawing as in construction, therefore, the mind reverts to the creative idea, the job to be done, the needs and conditions to be met, and the service to be rendered. Many a piece of drawing has been superb in execution but pitiable in conception. Perhaps too much time has not been given to the mere technique, but certainly too little time and effort have been devoted to the accumulation of ideas worth expressing and too little importance has been attached to the significance of ideas properly conceived, thoughtfully developed, and adequately expressed. Art schools have been somewhat remiss in that they have sent out young people with certain means and facility of expression but without developed capacities for ideas worthy of expression.

The technical schools have in the past devoted their time too exclusively to the study of tools and processes and to practice in standardized manipulations. Not enough time has been given to the study of tasks to be done, situations to be met, interests to be served, to all of which mere tools and practices are but incidental. Multitudes of people have gone thru the schools with never an opportunity of pursuing ideas of their own and of attempting to work them out to completion. Then they have been sent out without initiative or training in attacking new situations to take up tasks with which they were unfamiliar and to undertake social and industral problems of whose import they have no information or warning. Happily such a situation is now rapidly disappearing.

The drawing and manual training of the elementary schools have been especially barren of ideas, unresponsive to needs, unyielding in their routine, and unproductive of satisfactory and permanent results. The subjects have been approached too much from the standpoint of tools to be used and processes to be learned, and not enough from the standpoint of jobs to be done, conditions to be met, and real, vital tasks to be accomplished. Tools and processes and pencils and T-squares and ink and sand paper and all the rest are but means and accessories necessary but incidental to the carrying out of important work, just as the letters of the alphabet are indispensable instruments for the reading and writing of a language. But the placing of the whole emphasis upon the tools and processes, as manual training and drawing teachers have too generally done, is in exactly the same category with the teaching of reading and writing by the alphabet method, a method that has been thrown into the scrap heap of educational absurdities by practically every teacher in the land.

The Idea Back of the Drawing.

The idea involved in drawing as related to elementary shopwork is furnished in a general way by the conditions and needs which have to be met by a project for construction. The method of project selection and assignment is a topic for another article and need not be discussed here. Let us suppose that the time is late winter and that the project selected is a Martin house. Certain fundamental facts and requirements, such as minimum cubical contents, size of doorway, maximum amount of lumber to be used, etc., are determined upon and specified.

The first problem for the class is, therefore, the designing of Martin houses within the limitations set by the general specifications. These houses will, of course, vary according to the individual notions of the members of the class in matters of size, shape, style of roof, methods of support, and other details, but will agree in the specified fundamentals.

For the members of the class to get their ideas into tangible form, drawing, in the nature of freehand sketching, comes in as an indispensable means of expression. The first crude sketches constitute the basis for the succeeding efforts and furnish the skillful teacher his coveted opportunity. If he is himself fairly skillful at sketching, the success of the undertaking will

be all the more pronounced. By general class instruction, the teacher can bring out certain principles of building construction and designing that will modify the first sketches made by the pupils. Then by individual conferences and definite suggestions and criticisms, the original ideas embodied in the first sketches are so modified as to bring all the designs within the scope of the teacher's approval. In most cases, the class will make new and more careful sketches of the proposed buildings, embodying the suggestions and eliminating the points of criticism offered by the instructor. By this time, if the matter has been skillfully handled, a certain enthusiasm will have been aroused in the problem, and the enthusiasm will have spread even to the matter of sketching for its own sake. Almost surely, some members of the class with greater facility in drawing than the rest will have sketched a number of different designs, thus adding to the general interest both in the houses to be built and in the drawing itself.

In this attempt at freehand sketching, the teacher will emphasize the absolute necessity for the use of drawing in getting one's ideas down to definite form, and will remind the class of the practice of the architect, the furniture designer, and the inventor in arriving at their final designs. Drawing must be made to appeal to the boys as something necessary in connection with the work of the shop because of the very nature of the work and not because it is in the course. It must be given a standing in the minds of the boys among the men and women of the working world who use drawing as a means of creating new designs in automobiles, gas engines, aeroplanes, dynamos, dwellings, locomotives, and machine guns. Trips to the designing and drafting rooms of various factories are of the greatest value and inspiration. Examples of the original drawings made by designers in piano, automobile, furniture, and other factories are obtainable and serve as a permanent source of assistance and satisfaction both to the class and the teacher.

From this one experience in sketching bird houses, a general interest may be aroused in the sketching of various houses, that would carry over into the art classes or the home work. People do not acquire the general power to draw. They learn to draw definite things. An architect might not excel a blacksmith in drawing a cat, unless he had practiced drawing that particular beast. By the various experiences, therefore, in making drawings for the projects to be constructed in the shops, the classes develop a considerable range of skill in freehand sketching.

The Working Drawing.

After the sketches have been completed giving the general form and appearance of the Martin houses, the next step is the planning of the details of dimensions and constructions and the making of working drawings. For the purpose of preventing any delay in getting to work on the construction of the houses, it is often if not always advisable to have freehand working sketches made of the floor plans and necessary elevations, bearing the general dimensions and necessary data for the getting out of stock and the beginning of the bench work. At another time, the finished working drawing with drawing board and instruments will be made. It depends very largely upon the teacher as to how far the matter of finished working drawings may be carried in the seventh and eighth grades. There is no very conclusive reason except, of course, that of time limitations, for excluding inking, tracing, and blue printing from the work of these grades. In fact, these processes appeal to boys in these grades with a peculiar force and have often been known to wield a greater influence in adding interest to the work of drawing than anything else. Of course the time element is a great handicap, but an interest in drawing may very readily carry over into the home, producing results and revealing ambitions that had never been suspected. The main caution is that the drawings should not be mere "plates" preserved for the teacher's inspection.

In connection with the working drawing in relation to the shop work, there is abundant opportunity for the drawing of simple details and for the use of simple geometrical problems involving constructions and methods of drawing required in the working drawings. After a basis of reality has been established, there is no danger whatever in grouping about it as illustrative of its various relations, a limited number of geometrical problems that, in the absence of such basis, would be wholly abstract and objectionable. In this as in other subjects, no difficulty is experienced where the proper contact is made with the world of reality. No amount of work, however exacting and laborious, is too much for boys who see the significance of their tasks.

The item of lettering is a very important and a very difficult one in drawing. More drawings are spoiled by poor lettering than by any other one thing. It is doubtful whether the abilty to letter skilfully will ever be generally acquired by the prevalent methods of teaching. A course in mechanical drawing should undoubtedly not begin with a plate of lettering to be slowly and laboriously drawn, erased, and redrawn and then presented as "exhibit A" for the teacher's inspection. Perhaps more time is wasted in the laborious preparation of "plates" for the approval or disapproval of the instructor than in any other way.

Just as in the other phases of drawing, it would seem advisable to have the class meet the actual necessity for this phase known as lettering, and to appreciate fully the importance of good lettering as it relates to the drafting and designing of the commercial world. Given this emphasis and this contact with reality, the task of enlisting the interest and the best efforts of the class in lettering is not a difficult one. It is the same story over again of convincing the class of the significance of the work. The surest way to have this element

of reality enter the matter of lettering is to have the lettering based upon the needs of the working drawings of the class.

My own opinion is that in the pupil's first efforts at lettering, a half-dozen plates should be made in the time commonly given to one, and that all of them should be thrown into the waste basket. After the style of letter has been selected and explained and the model put before the class, the pupils should make the first few copies of each letter very slowly in order to get a clear conception of the form of the character and the method of the strokes, and then the remaining copies of the letter should be made with a free, rapid movement. In a comparatively few minutes, the plate should be completed and discarded and another one executed in the same manner. If it seemed advisable, after a few repetitions, a kind of "progress sheet" or finished plate might be made with somewhat greater care for preservation. The proper method of learning to letter is in all essential respects identical with the method of learning to write. Facility is acquired by free practice and not by the slow, laborious, and cramped repetition of individual characters. There is one difference which is dependent upon the difference between print and script. In writing, it is necessary to use the letters in combinations, because one of the chief difficulties lies in the joining of the characters together, while in lettering it is not essential, except for interest, to use the letters in word combinations at first, since there is no joining of characters which would modify in any way the individual letter.

The Art Elements.

When pupils undertake to plan bird houses, furniture, aeroplanes, or anything else, they must call to their aid the fundamental principles of design. When they attempt to deal with lines, areas, and proportions and to adapt means and materials to orderly and purposeful ends, they are working in the realm of art. A project is the growth of an idea. Art on the one hand and construction on the other are the two cooperative forces which the idea uses to accomplish its growth and to get itself expressed in material form.

Those who have been more intimately concerned with the distinctively technical and mechanical phases of the industrial work have been somewhat disposed to shy away from and to frown upon anything called art. This attitude, no doubt, has been due in large part to a misconception of the real meaning of art and to the aloofness and disdain affected by many of the teachers of art toward anything technical or mechanical. And both sides have permitted a wide chasm to form between those who work in the shop and those who work in the studio, forgetful of the fact that in the heyday of art and craftsmanship, the worker was artist as well as artisan and the worker's quarters were both studio and workshop.

An intelligent man with a misconception once asked if a piston rod would be more beautiful "if it were artistic and had flowers on it." The explanation was made, of course, that flowers on a piston rod would be wholly and crudely inartistic, since they would unfit it for the purpose for which it was designed. Nothing can be weak, useless, and unfit for service and still be artistic. This question illustrates the quite prevalent misconception that all art is either pictorial or decorative, and is not concerned with use or purpose. It discloses an alarming ignorance of the principles and place of structural design. The tendency to ignore or to cover up the structural elements, to disregard the characteristics and limitations of the materials to be used, and to undervalue the fitness and suitability of the design and medium for the purposes prescribed, has given the world its masterpieces of ugliness and poor taste. Art has entered many a home, if at all, thru the kitchen rather than the parlor. The exquisite adaptability of the modern kitchen utensils, ranges, and other appurtenances to definite purpose and use, with their simplicity of form and their absence of gaudy and meaningless decoration, embodies the essence of taste and refinement commonly called art. When the furniture, picture frames, wall paper, tapestries, and chinaware of the average home rise to the level of the taste shown in the equipment of the modern kitchen, a long step will have been taken in the direction of making art a part of the life of the people.

The thing to be kept in mind, therefore, is that there are aesthetic possibilities, even necessities, in everything we have and in everything we undertake, and that the vast majority of our decisions and choices concerning the things we make, the things we buy, the clothes we wear, the tools we use, and oftentimes the food we eat are based primarily upon aesthetic considerations. Whether one buys a house or a horse, a coat or a coffee mill, a sedan or a sewer pipe, the final decision, wherever there is a choice, will be very materially influenced if not determined by appearance, the refinement of line and color, the correctness of proportions, and the unity of means and purpose which every sane conception of art and design embodies.

It is of primary importance that those who control and guide the constructive efforts of the pupils should thoroly understand the principles of design and fully appreciate their far-reaching applicaton to all the problems of construction which the pupils may undertake. Likewise, it is just as important that those who give the art instruction shall appreciate the fact that the principles of art and design are vitalized and made a hundred fold more effective when they are brought down into the children's own realm and set to functioning in the common and useful things of their own making. In this way, the principles of art and design become the indispensable guides, the source of help and inspiration, the orderly method of procedure, rather than a kind of intangible "will-o'-the-wisp" about which only artists may talk. If the time ever comes when art

has interwoven itself with all of our activities so that it, like food, satisfies a natural craving, so that it touches everything we do with dignity and charm, and so that it resides within us instead of the art museums in distant cities—if that time ever comes, it will be brought about by making children conscious of the fact that art is not an artificial thing to be stuck on, not an intangible thing to be spoken of in a lingo of its own, but that it is a very real and essential energy in obedience to whose principles all the tasteful and pleasing things of nature and of life are molded. If people could grasp the idea that *art is an energy* which creates, determines, and controls in the realm of aesthetic appreciation, and not a little sleight-of-hand, a model to be copied, or an air of superior culture to be affected, a new attitude toward art and all that it represents would soon be apparent.

In the planning of every constructive problem, two phases of design are at least considered, first, structural design, and second, decorative design. Plans for the frame of a house, the cover of a book, or the case of a piano are first worked out with reference to their structural possibilities and necessities, the inter-relations of parts, and the proper proportions to meet the requirements of good taste under the limitations set by the needs to be satisfied. After the structural elements have been determined and the proportions established, there arises another consideration, namely, the need or possibility of the enrichment of the surfaces which the structural necessities have created. Here then is the field of the second phase, the decorative design. In the case of the house, the question combines the practical consideration of preservation with the aesthetic one of enhancing the beauty of the building by means of paint. In the case of a piece of furniture, it would be a question as to whether the surfaces might be beautified by means of panels, carving, or other decorative treatment.

When a design transgresses the laws of use and purpose, it violates the first principle of art and hence fails of artistic merit. Hence the critic who remarked that certain things were "too artistic to be good" confused two perfectly incongruous ideas and stated a perfectly impossible and absurd proposition.

To know the underlying principles of art and design is very important, but to think that such knowledge is the essence of art is wofully incorrect. Art is not an intellectual assent to certain principles. In essence, it is rather an emotional response which comes of long continued and intelligent contact with objects of art which embody such principles. Persons capable of artistic appreciation are conscious of a sense of unpleasantness and dissatisfaction in the presence of disorderly arrangement, bad proportion, inharmonious color schemes, and purposeless effort. Likewise, such persons experience the opposite sensations of pleasure, satisfaction, and comfort in the presence of those objects which meet artistic requirements and cultivated taste. This reaction may be called appreciation.

Not every person can become an artist in the sense of being able to produce works of art. But every person can develop an intelligent appreciation of the beautiful, just as one can develop a keen appreciation of football without being able to participate in the game, although such participation would materially affect one's appreciation. If for no other purpose, it is very much worth while to emphasize the principles of art and design in the work of boys and girls in order that they may become intelligent consumers and home makers, in order that they may have a basis for independent choice, and in order that they may be able to appreciate and enjoy what they may not be able in any manner to produce. To this end, it is desirable that they have as frequent opportunity as possible to engage in the necessary designing for their own projects, since one's appreciation of a piece of art or technical skill is materially heightened by one's own attempts along the same line. It is perhaps impossible to tell just how far technical execution may influence aesthetical appreciation, but it is quite generally agreed that, especially in the more elementary stages, such influence is very pronounced.

The Question of Time.

One of the most difficult of the unsolved problems in connection with the manual training work is the problem of the time for the drawing and designing. In the vast majority of cases, no extra time is given for mechanical drawing in the program for the elementary school, altho the pupils are required to devote a certain amount of time each week to drawing under the direction of the teacher of art. Hence, it seems thus far that the instruction in drawing and designing as related to the shop work must be given by the shop teacher. This being so, the drawing must usually be done in the shop during the time allotted in the program to manual training, either at the beginning or at the end of the period or on alternate days. The very fact that drawing and designing must be done on the benches in the shop creates at once a difficult situation. As drawing has been conducted and perhaps under any conditions, boys do not take as kindly to drawing as to the shopwork; hence to put a class of boys to drawing in the shop and on the very benches where they are eager to get to work with saws and planes and chisels, is to face a situation not very conducive to good order and attention to the matter in hand. Those teachers who have access to regular classrooms can obviate the difficulties very much by conducting the drawing in such rooms on the regular desks.

Since a certain amount of time must be devoted by the boys to drawing with the art teachers, some shop instructors have tried to arrange a scheme of correlation. In such a scheme, the sketching, working drawing, and designing are done in the time of the regular art instruction. This plan assumes, of course, familiarity on the part of the art teacher with mechanical drawing, methods of construction, materials of construction, and

the general theory and plan of the manual training teacher's courses. It is unnecessary to call attention to the impossibility of finding teachers who are prepared or who may reasonably be expected to be prepared to handle all of such work in addition to the work of their special line. Hence, drawings made under such an arrangement are as a rule not usable, except in those rare cases where both teachers have abundant time for frequent conferences and thoro preliminary preparation. If the time for the art work and shop drawing could be so arranged that the two teachers could work together with the class, then something in this direction might be accomplished. This plan is used in the training schools of some of the normal schools and teachers' colleges, but as a public school method, it probably may be dismissed as impracticable if not impossible.

In a few instances, the plan has been tried of setting aside a certain portion of the whole time allotted to manual training to be devoted exclusively to the drawing as related to the shopwork. To illustrate, let us suppose that an eighth grade class is due to spend sixty hours in manual training. If one-fifth of the time should be allotted to drawing for the year, then under the scheme in question, the first eight weeks of the manual training time would be exclusively devoted to preparing working drawings, designs, etc., for use in the shop during the remaining 32 weeks.

No doubt better drawing is easily possible under such an arrangement, but on account of the total separation between the drawing and what seems to the boys an immediate constructive need, the plan would seem to be objectionable. It would take a skillful teacher to hold the interest of the classes and it would seem that the restlessness of the boys would be intensified by the long wait for the opportunity to go to the shop. Besides these considerations, this plan would require decisions the very first few weeks of the year as to the projects to be undertaken thruout the whole year, and would involve the possibility of changes of decisions during the year. Of course, if a stereotyped list of models is used, the matter is greatly simplified, as the drawing would be unrelated and useless and could be done as well one time as another, but, like the woodwork, its value would be infinitely less.

For the present, the drawing will probably be done more satisfactorily by the manual training teacher in the shop as the occasion demands, by using the benches for drawing tables and a part of the manual training period for drawing instruction. With the proper enthusiasm and encouragement for outside work, some fairly satisfactory drawing may be secured.

In the part of this article which deals with art as related to the shop, I have neither claimed the good fortune of being an artist nor attempted the impossibility of indulging in the technical language of art. I have approached the whole matter from the simple and perhaps crude standpoint of those who, like myself, must look upon art from the standpoint of the shop. The terminology, therefore, may not be technically accurate, but I trust that it is at least expressive and understandable to the manual training teacher.

AN OVAL TURNING CHUCK

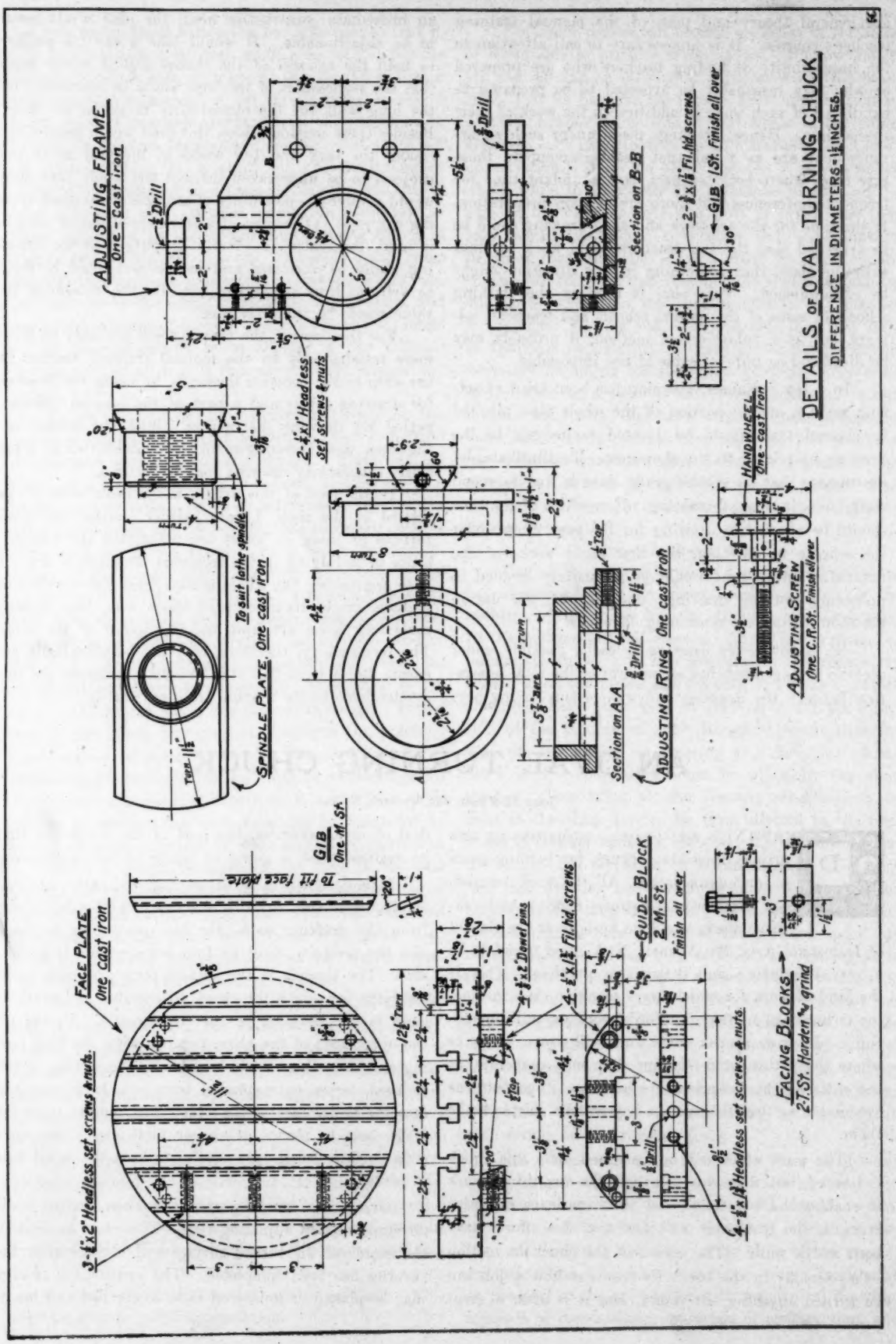
John H. Faust, Mt. Vernon, N. Y.

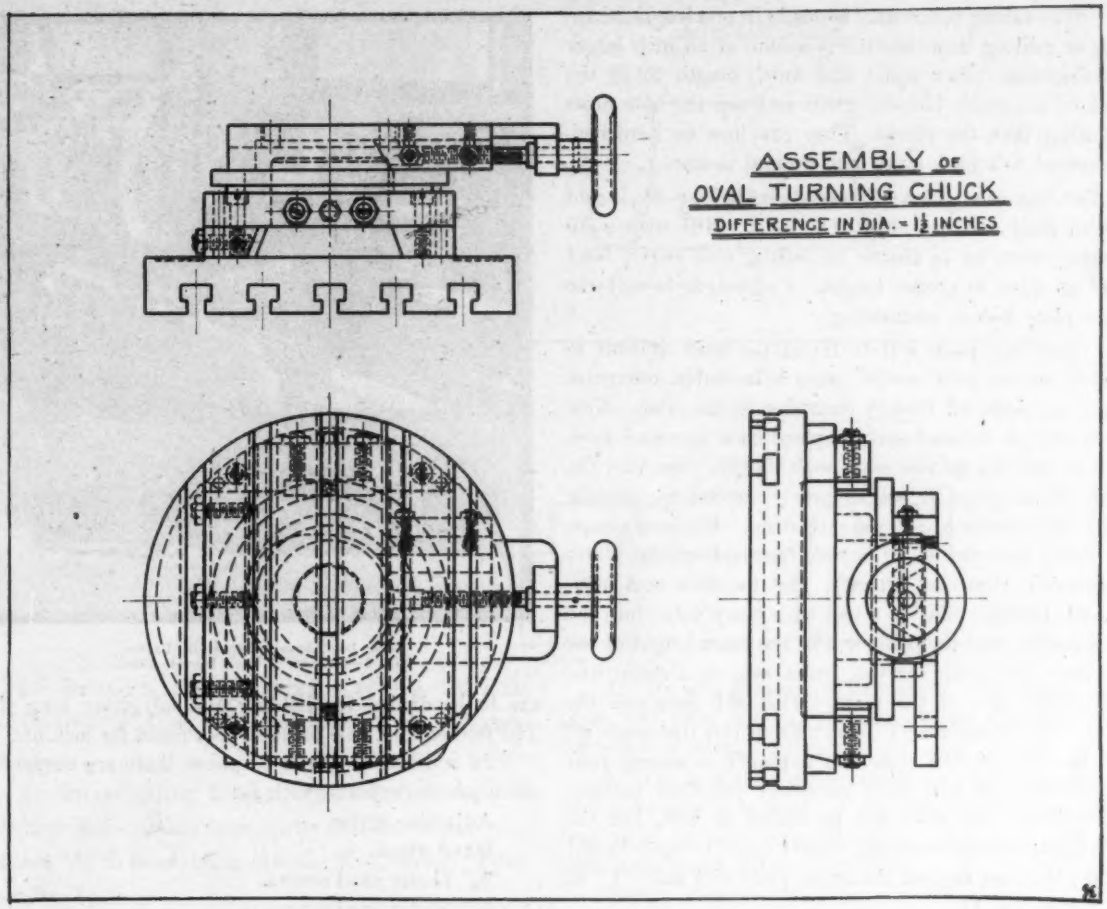
DRAWINGS and pictures accompanying this article illustrate a chuck for turning ovals on an engine lathe. All the work, consisting of drawing, pattern making and machine work was done by boys at the School of Industrial Arts, Mt. Vernon, N. Y., and found to be a very interesting and instructive problem. This is the kind of work for which every machine shop instructor is hunting, in that it affords work on milling machine, planer or shaper, lathe and drill press. Here is where the pattern and machine shop may cooperate, as the entire outfit comprises five castings. The patterns are simple so that the average boy will be able to make them.

The work which can be machined upon this chuck is limited, but when one considers the amount of work it enables the boy to do and the experience he gains from it, the instructor will find that his efforts have been worth while. The action of the chuck in motion is mysterious to the boy. He wonders how a job can be turned anything but round, and it is after a great deal of explanation on the part of the instructor that he realizes what is going on inside of the mechanism.

It is designed to fit the average 14" lathe, but can be altered to suit any size machine. With a little help from the drafting room, the face plate may be made like the ordinary three or four-jawed chuck if preferable. The threads in the spindle plate are made to fit the lathe for which the chuck is intended and must fit close to the shoulder of the live spindle. Facing off the upper part of the plate, turning down the hub, boring and threading should be done in one setting. When finished, screw onto spindle, turn outside to size and face the under face of the slide; then remove from the lathe, bolt to planer or shaper table and plane male slide surface, being very careful to keep the bored hole in center.

Great care must be exercised when cutting male dovetail slide on adjusting ring. This must be kept in the center of the turned surface and is done after the turning has been completed. The upper part of ring may be planed or milled off close to the pad and to the


DETAILS OF OVAL TURNING CHUCK
DIFFERENCE IN DIAMETERS-1½ INCHES.
ADJUSTING FRAME
One - cast iron
Section on B-B
2-½x1" Headless set screws & nuts
2-½x1" Fil. hd. screws
GIB - 1 St. Finish all over
HANDWHEEL
One - cast iron
ADJUSTING SCREW
One C.R.St. Finish all over
SPINDLE PLATE. One cast iron
To suit lathe spindle
ADJUSTING RING, One cast iron
Section on A-A
GIB
One M.St.
To fit face plate
FACE PLATE
One cast iron
3-½x2" Headless set screws & nuts
2-½x2" Dowel pins
2-½x1" Fil. hd. screws
GUIDE BLOCK
2 M.St.
Finish all over
FACING BLOCKS
2 T.St. Harden & grind
4-½x1" Headless set screws & nuts



Assembly of Oval Turning Chuck.

proper height (1⅞"); this allows for bolting the ring to the table of the shaper, milling machine or planer for cutting dove-tail, and it is only necessary to set the stroke a little longer than the length of the slide.

The adjusting frame is bolted to the center end of the head stock and when boring the hole see that a reasonable amount of clearance is allowed, so that the adjusting ring may be set true to the center of the lathe. This will permit the turning of a true cylinder as well as an oval when proper adjustment is made on the adjusting screw. The top and bottom may be planed or faced in the lathe. The dove-tail may be milled or planed and the male slide fitted so as to bring ring as nearly central as possible. The tapped hole in the ring for the adjusting screw is not drilled until the frame and ring have been assembled; then it may be spotted thru the clearance hole in the frame, removed and the remainder of the work finished.

When making the small jib, plane top, bottom, back and both ends to size, then cut angle to fit snugly between the ring and bracket. This allows for filing and scraping into place. Necessary drilling and tapping may then be finished. Make set screws long enough to allow for lock nuts.

After bolting the frame to the lathe and setting the ring in place, screw the spindle plate on the spindle and note the amount of clearance left between the ring and plate. They should just clear one another. The safest way to guard against jamming is to allow about one-eighth to three-sixteenths on the end of the hub and face off to suit. Before beginning a job, however, it is best to measure the distance and make necessary changes on the drawing, because every lathe is somewhat different. After this has been found correct, try the offset adjustment and note the amount it permits. This should be about ¾" to permit the turning of an oval having a difference of 1½". Cut away the inside of the adjustment ring if clearance is not sufficient.

The guide blocks make an excellent shaper or milling machine job. The stock may be machined in one length and sawed apart, after which both pieces can be held in the vise and slotted together. Do not cut the radius until blocks have been put in place and marked off. This will make a neater job. Mark off and drill holes for filister head screws, but do not drill dowel pin holes. Now drill and tap for set screw holes and center hole for cap screw. Make set screws long enough to allow for lock nut.

The facing pieces may be made in one length, shaping or milling them one thirty-second of an inch larger in thickness. Saw apart and finish length to fit the slot in the guide blocks. Drill and tap the hole after spotting thru the block. They can now be hardened, tempered to a dark straw and ground to size.

For the face plate jib use ¼"x1⅛" or 1¼" cold rolled steel and cut about 11" long. Mill with a 70 degree cutter or in shaper by setting over swivel head and machine to proper height. Cut length to suit the face plate before assembling.

The face plate will be found the most difficult to handle unless a 16" or 18" lathe is available, otherwise plane or shape off face by clamping to the table. Now turn over on finished surface, plane back face and dovetail to suit the spindle plate with the jib. See that the hub of the plate is set as nearly central as possible with the outside of the rough casting. File and scrape in slide, then put on lathe with face and spindle plates assembled, (the rest left off). Set the slide at a horizontal position. Fasten a tool with sharp point into the tool post so that the point will be the exact height of the center. Now with the tool point, scratch a sharp line across the face of the plate. This will give you the center of the central "T" slot. From this line mark off all the rest of "T" slots. If a planer is among your equipment you will want no better job than planing "T" slots. The slots can be milled as well, but the piece will require resetting several times to cut straight slots; then set against the angle plate and mill "T" as in figure No. 17.

Having completed the cutting of the "T" slots, remove from machine and fasten angle plate on platen of mill or planer in a convenient position. Bolt the face plate to the angle plate, (back end exposed) and slide at right angles to the table. With a surface gage set at the height of the center mark a line across both sides of slide pads. Now set the surface gauge 3⅝" lower and mark another line across. This will be the position of the first guide block. Clamp the block in this position and spot holes for filister head screws. Remove the block, then drill and tap spotted holes. It is then screwed in place with facing attached. Now set the adjusting ring in place and locate the position for the other block, being very careful that the two blocks are parallel. After this has been drilled and bolted in place it is necessary to drill dowel pin holes. Mark off the position of the holes and drill with 23/64" drill 2" deep (including block), then use ⅜" reamer. Now cut off four pieces of ⅜" drill rod, slightly round off ends and fit to the holes so that the pin drives into the block and pulls from the casting. The pins are then driven in place and the blocks are fastened down. The facings are now adjusted so that the ring can be passed thru and finally tightened in place with the aid of the set screw and cap screws. Three set screw holes

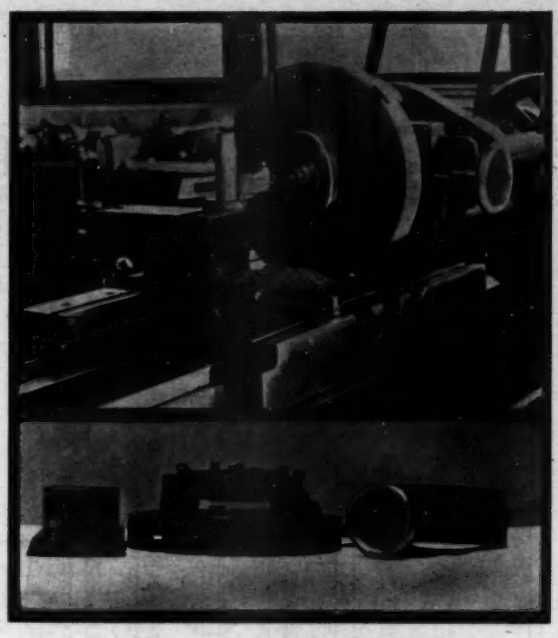


Fig. 1—(Above)—Chuck in Lathe.
Fig. 2—(Below)—Chuck Disassembled.

are to be drilled for holding and adjusting long jib. The face of each hole must be spot faced for lock nut.

In addition to the large pieces there are numerous small jobs to be made, such as:

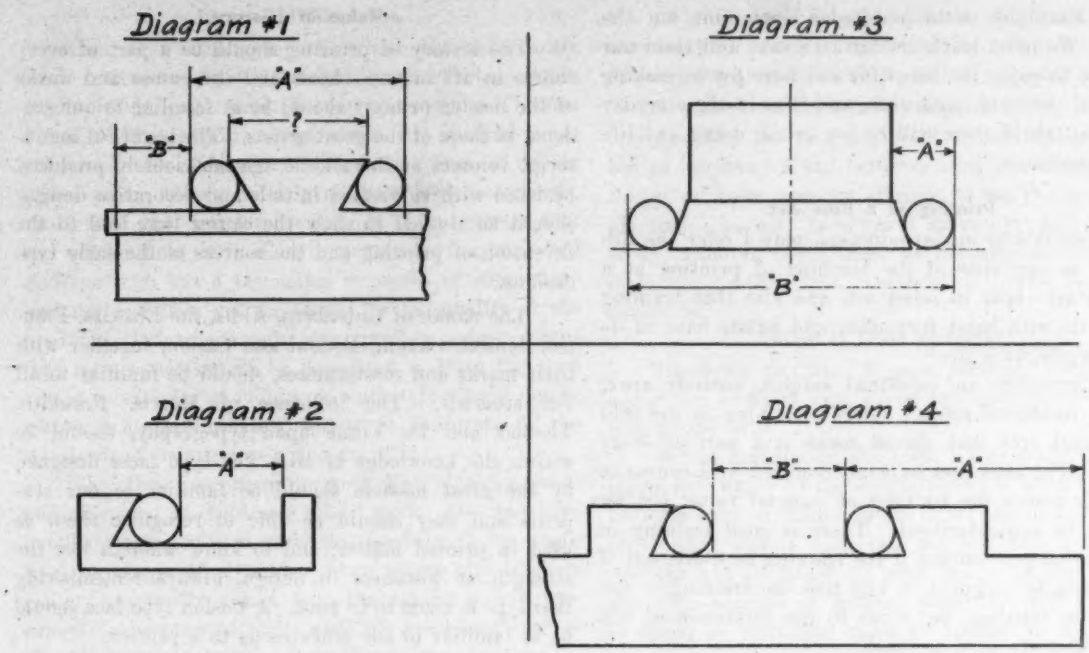
Adjusting screw.
Hand wheel.
⅜" filister head screws.
½" filister head screws.
½" cap screws.
⅝" cap screws.
¼" headless set screws.
½" headless set screws.
¼" lock nuts.
½" lock nuts.

The chuck is now ready to assemble and try out. This is done by bolting the adjusting frame (with ring attached) to lathe. Now assemble the face plate, slide and guide blocks, then screw in place upon spindle of lathe. *(Note:* The slide should not interfere with guide blocks. See that the ring enters space between blocks). Set adjustment of oval in such a position that it will turn a true circle, then turn off outside diameter of face plate to size and your job is complete. Fig. 2 shows the chuck with turned oval in lathe. Fig. 3 is the chuck disassembled.

If you find this chuck too large for your lathes, get the drawing department busy, changing the dimensions to suit your machines. It is a problem worth while. The mechanism can be designed to fit the smallest lathe.

Here is an opportunity to work in some practical problems in shop trigonometry for the boys:

1. Obtain proper width of slide "A" on adjusting screw with the aid of two cylinders measuring 1" dia. each. (Diagram No. 1).



2. Extend 1" rod beyond center of ring. Now obtain distance "B" from rod to outside of ring. (Diagram No. 1).

3. On adjusting bracket, finish straight side of slide to proper distance from center of hole. Now obtain distance "A" to bevel, using cylinder 1" diameter. (Diagram No. 2).

4. On spindle plate, (diagram No. 3) obtain distance "A" from hub to cylinder. Obtain distance "B" for width of slide.

5. On face plate, (diagram No. 4) obtain distance "A" from outside surface. *Note:* When planing slide of face plate, see that an equal amount of stock is left all around perimeter for turning off.

Obtain distance "B" (diagram No. 4).

PRINTING A FINE ART

E. E. Sheldon, Supervisor of Apprentices, The Lakeside Press, Chicago

SOMEWHERE there is a small pamphlet entitled "Accuracy First", a discussion of some subject wherein the author contends that accuracy is a virtue than which there is none nobler. Our libraries are filled with volumes on "How to Teach", "Why to Teach", "When to Teach", and "Where to Teach", and then what is it all about?

Printing is a new subject that now *demands* the attention of educators and volumes galore are beginning to appear on the how and the why, the when and the where, and if one may judge by many of these volumes themselves that are appearing, as examples of typography presented to those who teach, or pretend to teach printing, there is great need of a little closer cooperation between the art department, the English department, and the printing department, to say nothing of a little consideration by the executive department in differentiating between training and exploiting students in the printing department.

Recently a volume from the pen of a man with a national reputation in teaching circles was issued by a concern, also nationally known, to be used principally by teachers. Upon examination of the binding, one would remark, "A beautiful volume", backbone, side-stamp, cloth, cover design all in good taste and harmony, but beneath that cover—words fail to describe the atrocities committed in the name of printing. The harm done by that single volume cannot be measured in any terms. The good that might have been done had just a little attention been given to detail was lost entirely. However excellent the content, one reader at least lost all interest by the horrible example constantly before him. If one *learns* to know and love books, to appreciate art in printing, a higher standard will be set in all things and art will come to occupy a larger place in life.

A recent volume from a well known house on a technical subject, bound in full morocco, a beautiful dress, covers a monstrosity that would cause the most hardened to weep for the future of art in printing. The make-up, there was none; a folio (in romans) above a sunk chapter heading; chapters variously sunk; margins, an unknown quantity; type pages centered on the

page. Examples could be cited ad nauseum, but the point: We must teach art for art's sake and train our students to enjoy the beautiful and have joy in making beautiful pieces of handiwork, and then in the everyday workaday world there will be joy in the doing and life will mean more.

Printing as a Fine Art.

With this as an introduction, may I offer the following as one view of the teaching of printing as a manual art—bear in mind art, and also that training has to do with habit formation and habits have to do very largely with life?

Printing as an industrial subject, entirely apart from a vocational subject, offers a training in the field of manual arts that should make it a part of every course. The attention to detail required by a course in printing makes the training of especial value, but let me not be misunderstood. There is good training in any manual arts subject if the training be thoro, but if poor work be accepted in any line the training is not only poor training, but leads to the formation of bad habits that are hard to break.

The work in English, mathematics and design can easily be correlated with the work in printing and better work be done in each subject. All work in any subject should be done to conform to the principles of good design and accurate work with a reasonable speed attained as the worker progresses.

Let me be clearly understood. I have in mind printing as a fine art where there are training values in all the elements of good design and accurate English. There is no particular training or virtue in being able to place on end a few pieces of battered, broken, antiquated types smearing them over with a cheap compound called ink and taking a bad impression, wrongly placed on a nondescript piece of paper, and call it printing; indeed, there is more danger in attempting to teach printing as a manual art than in any other subject that has as yet been attempted in the schools. The ease with which duplicates of the work can be produced and scattered broadcast, leads to the formation of low standards in a subject that is a fine art, and as such should receive the study and attention that it deserves and did receive in its infancy.

Printing today ranks fifth among the industries in this country. The products vary from the beautiful handmade volumes produced by craftsmen who hold to the best traditions that the handicraft age bequeathed to us, to the ephemeral publications, catalogs, and circulars produced on a tonnage basis in great manufacturing plants. These plants are operated by hundreds of machine operators, none of whom know anything of the history or traditions of printing as a fine art. There is danger in the conditions that exist that our inheritance will be lost and printing as a fine art will degenerate until we will become content with the commonplace and accept it as the best.

Value of History.

The history of printing should be a part of every course in art in our schools and the names and works of the master printers should be as familiar to our students as those of the great artists. The beautiful manuscript volumes of the middle age laboriously produced by hand with rubricated initials and decorative designs should be studied to show the causes that lead to the invention of printing and the sources of the early type designs.

The names of Gutenberg, Aldis, the Elzevirs, Plantin, Jenson, Caxton, Bodoni and Caslon, together with their marks and masterpieces, should be familiar to all our students. The influence of Morris, Franklin, Thomas and De Vinne upon typography, should be within the knowledge of all. The type faces designed by the great masters should be familiar to our students and they should be able to recognize them as used in printed matter, and to know wherein lies the strength or weakness in design, always remembering that type is made to be read. A Caslon type face should be as familiar to our students as to a printer.

Every course in art should have as part of the regular work studies in samples of printing, critical studies in design, arrangement, color (from the standpoint of the printer), harmony, contrast, balance, margins, appropriateness, until finally every student is able to pass judgment upon the quality of a piece of printed matter, be it a letterhead or a volume de luxe.

With art as a basis and a deep-seated conviction in the eternal fitness of good models as the best silent teachers, and the ability to firmly refuse to be stampeded into turning out product to the neglect of training, one is safe in selecting printing as a manual art, if sufficient funds are available to equip a shop in a well-lighted, properly ventilated room. On no other basis should one attempt to teach printing for any training values. Dr. Hamilton says, "To put boys in an ill-equipped room, using antiquated methods, unbusiness-like practices, and badly chosen material is conducive to no good end. Such a situation cannot be saved by the best of instruction. With two or three series of carefully designed, well-cut roman types, the necessary material equipment to complete the shop and a small job press, one can do excellent work that has training values." Dr. M. V. O'Shea has said, "Some day we shall give more attention than we do now to the aesthetic character of school books, tablets, illustrative material and all other apparatus of the school. In my opinion, a child who uses a reading book of artistic makeup derives more cultural value therefrom than he would from all the pictures that could be crowded on the walls. Great as may be the influence of a fine picture upon the wall, it cannot equal that of the thing with which the individual is in vital contact every moment, and which he employs as a means to the accomplishment of his purpose."

Ideals and Standards.

One must needs sympathize with the unfortunate teacher of printing who makes every effort to train pupils to do good work but is expected, yes almost forced, to attempt to run a job shop. He is asked to get out blanks for the office, reports and even a weekly school paper, to say nothing of little jobs, letterheads, cards, and what not for the friends of the powers that be; and he must do it all with immature, inexperienced children with but a few hours or weeks of elementary training and then get the blame for the quality of the product. Printing taught for training values means that no product should be permitted to leave the shop except as samples of children's work. It should not be scattered indiscriminately unless it conforms to the standards of printing as a fine art.

The other extreme is the work done by older hands and given out as children's school work. One can have but little patience with pretended teaching in the woodworking shops of a lumber town where the teachers rather reluctantly admit that the exhibit pieces presumed to be student work were all *machined* over at Blank's factory, but were *assembled* by the students.

We must teach our students to have high ideals and definite standards, and where can it be done to better advantage than in the shops when we refuse to accept any work except the best the student can produce thru his own efforts properly guided? Even in corporation schools we must carefully differentiate between teaching and commercial work and never allow the latter to displace the former, even in the guise of teaching. Commercial work properly administered, when based on careful fundamental training, has high educational values either in school or shop. All work done should be held to good commercial standards, tho it restricts the range and quantity of work done, for one cannot afford to allow a student to attempt work beyond his ability and later have him suffer the consequences of the bad training that results.

School With Factory Atmosphere.

So much for printing as an industrial subject. As a vocational subject the question arises: Where shall the teaching of printing be done? The preliminary work may be taught in schools apart from the factory but with a factory atmosphere. Much of the teaching must be done in the factory under factory conditions. Jobs must be delivered on time and be according to specifications. Where can this be done but under commercial conditions? Who shall do the teaching? Certainly the practical craftsman, who has been trained to teach, be he in school or in shop as instructor. I believe that one is safe in saying that no one unable to earn a living at the trade should presume to teach a trade. It is not theory that is needed but ability to show how the work is done that is demanded of the trade teacher. It is a much simpler problem to teach a craftsman to teach than to teach a teacher the trade. We are very liable to underestimate the training one receives who learns a trade thoroly. We are apt to measure teaching and training values in terms of books.

Academic teachers have a legitimate field in a factory handling the teaching problems and welfare work, but as teachers we had better confine our efforts to the things we know and not attempt to teach a craftsman his trade; he may have spent as many years in close study, altho in other lines, as his so-considered more fortunate brother who completes a course in higher education.

What Is Good Printing?

In answer to "what is good printing", can we not accept the views of men whom the trade consider masters of the art?

Before considering the book, let us study the principles that apply to the simple forms of work from the business card or folder to the more elaborate piece of advertising and in each case we will find a different problem but all based on good design as the basis of art. No amount of general knowledge will solve the problem, as each case must be treated in a different manner, depending upon the fundamental principles involved, including size, use and expense. The author of *The Printed Book* says of the Modern Book:

"The chief factors which influence the appearance of a printed page are the design of the type and its arrangement upon the page. The ideal type for a book that is intended to be read should be so designed that the act of reading may be as nearly as possible unconscious. It should have a reposeful but sufficiently firm effect, carrying the eye smoothly along without any distracting features. The letters should so occupy the spaces allotted to them that they lose their individuality and continue closely into compact words; any characteristics which produce a thorny or dazzling effect should ruthlessly be suppressed. Many of the types of special design exhibit some eccentricity, often in but one letter, which attracts attention and mars the general appearance. The lower case "e" is a frequent sinner in this respect by reason of the angle at which the cross-bar is tilted; and the tail of "g" is a troublesome problem. It would be invidious to exemplify these weaknesses, but those who have examined these types will readily recall instances.

The preponderating use of roman type is evidence of its superiority for general purposes. Most modern fonts of this letter follow either the Caslon or Jenson model. The former has the long letters tall in proportion to the body of the type, and this gives the lines a more open appearance than in the Jenson style, which usually has a larger faced character with less difference in height between long and short letters, and the lines thus seem closer together.

The appearance of a printed page is also largely affected by the size of the type, the distance between the lines, and the spacing between the words. In the early

part of the nineteenth century a comparatively small-faced type with a liberal amount of space between the lines was in favor. A century later the tendency is to the other extreme, and we now frequently see a large-faced type, the lines set closely together, and narrow spacing between the words. Occasionally, the customary breathing space after a full stop is so contracted that the break is hardly greater than between the words of the sentences; and, sometimes, even the paragraph is abolished and, instead, a small ornament is inserted in the line at the point where the new paragraph should begin. All this may produce an artistic effect, preserve "the color of the page" and so forth; but it is fatiguing and tiresome to read. The eye is so much occupied in deciphering the words of the print that the mind is not at full liberty to grasp the meaning the words are intended to convey.

A book is much pleasanter to read if the words are sufficiently distinct not to require a sustained effort to disentangle them, and if the lines do not crowd upon each other but are clearly enough defined to be followed with ease. The spacing should correspond in some degree to the natural intervals observed in reading aloud. Good spacing, like good punctuation, is an aid to ready comprehension of the subject matter, and may be likened to phrasing in music. Certain established features of the printed book, such as title page, head-lines, and pagination, which were adopted in the course of its development, were doubtless the outcome of considerations of convenience.

The Construction of a Book.

In setting out to convert the manuscript copy of any work into a printed book, a number of questions at once arise. Chief among these are the format (shape and size) of the book; the kind of type to be used; and the quality of paper; the illustrations, if any. One of the initial questions is, what shall be the format of the book? Many considerations go to the setting of this important point. The use to which the book is intended to be put; the subject matter; the extent of the manuscript; and even the illustrations, if any, which are to accompany it, or, frequently, which it is to accompany.

The first page of a leaf, the right-hand page of an open book, is called the recto of the leaf, and the second page, the left-hand page of the open book, the verso. When every page is numbered, the book is said to be paged; but when a number is given to each leaf only, the book is said to be folioed.

The selection of the type to be used for a book depends, in great measure, upon the size of the page and the amount of matter contained in the work. If the book is very long, it may be necessary to use a small type in order to keep it within the desired compass, and other considerations will have to give way; but in many cases the choice is unhampered by this condition. To make a presentable book—one that shall in the general appearance of its page satisfy the eye, and at the same time be comfortable to read—the size of type must be carefully considered in relation to the size and shape of the page. The length of line, the number of lines to a page, and also the relative proportion of the margins have to be studied. The main thing to be aimed at is legibility. Too long a line of small type is trying to the eye, both in following the line and in picking up the next; while large type closely crowded gives a confused effect and is almost as bad. The proportion of the margins on the four sides of the printed page has an important influence upon the appearance of the book. These proportions are not equal, and they are not haphazard. If all the margins were of the same width, the printed page would appear to be both nearer the outer edge and lower down than its actual position, as if the print were slipping off the page. Experts in such matters tell us that the aesthetic unit is not a single page but that the two pages shown in one opening must be taken together, and that the margins to be of correct width should be in the following relative proportions:

Upper, 1; lower, 2; inner, ¾; outer, 1¾.

When the lines of type in a page are set close together without any space between them, they are said to be "solid." Sometimes the lines are slightly separated by means of thin strips of metal called "leads" placed between them; the type is then said to be "leaded." A moderate sized type leaded is often pleasanter to read than a large faced type set solid, tho votaries of the book beautiful would probably declare for the "all-overish" appearance of the large type. A page of leaded matter contains fewer lines than a similar page of solid matter.

Essentials of a Type Page.

Mr. Theodore L. De Vinne wrote as follows: "The average journeyman does not appreciate the skill and experience required for the best plain printing. He does not appreciate the superior beauty of a well-cut face of Roman type over any ornamental form. It would be a wise thing in schools of typography to have a young man study carefully the books that have been printed by the great printers of the world from Nicholas Jenson to Charles Whittington. No doubt he will find in any and all of these books some peculiarities to which exception can be taken, but if he studies long enough and close enough, he will see in

The blackness of the ink,
The readability of the type,
The simplicity of the arrangement, and
The general adaptation of printing to the subject,

features which he but rarely finds in good modern work. A young man should be trained to do ordinary things well before he attempts to do what is difficult or eccentric. Educated people all over the world look upon a good book as the highest triumph of typographical art; and its merit is always gained by its simplicity. 'The last thing to learn is simplicity'."

Enthusiasm is an important factor in success, especially in an occupation so complex as printing: but how can one who is ignorant of the history of his occupation have a deep-seated, impelling enthusiasm? Enthusiasm must be based on fine sentiments which a mere dollar goal never cultivates. When a youth is taught or learns to reverence his work, he will be a better printer and citizen. I have known quite a number of master printers who were (or are) imbued with reverence for their work and all have been more successful for it.

Those who desire to learn the printing trade must remember that it is a question of years, not months; that the title of printer is an honorable title, and that the salary is commensurate with the effort required. Men with a vision, who can see behind the type the designer, and beyond the type the work of art, may fill positions as artists or leaders in advertising fields.

Finally, as we all have to do with printing in various degrees, let us learn to appreciate the best than can be produced, whatever it may be, and accept no other, and printing will remain to us as a heritage. From the great artists we will all have learned to appreciate art thru art and our joy in living will be the greater.

Felt: A Fascinating Fabric for Expressing Design

Bonnie E. Snow and Hugo B. Froehlich

Article Three

A Block Printed Table Mat.

BLOCK PRINTING as a craft is not new in our schools, but block printing when applied to felt is so different in appearance from effects secured thru printing on cotton, silk or velvet that fresh interest is immediately awakened. Fig. 1 shows a table mat about twelve inches square, made of orange felt with a border design printed in black. One block only was used in the printing. The edges of the mat are not hemmed, and no lining is required. It is soft and thick, as a protector to the polished surface of a table should be. Its color may be varied to suit the decorative scheme of the room in which it is to be used. The mat illustrated was planned to be placed on an oak table, under a brass bowl filled with calendulas or nasturtiums.

For the benefit of those not familiar with the preparation of the linoleum block and with the method of using the block in printing, Figs. 2 to 6 are given. Fig. 2 shows a simple design which has been drawn on squared paper, then traced on thin paper and pasted to the upper or "rubber" surface of the linoleum block,—in this case, about an inch and a quarter square. A sharp stencil, or pocket knife, is seen in Fig. 3, held in the proper position for cutting the lines. All that part of the block not needed in printing the design is cut away and dug out. Edges must be kept straight and corners must be left clean. Fig. 4 shows the cut block ready for printing.

The best medium for printing is oil paint in tubes. This paint must be thinned by the addition of turpentine or gasoline. A pad made of several thicknesses of outing flannel should be saturated with the thinned oil

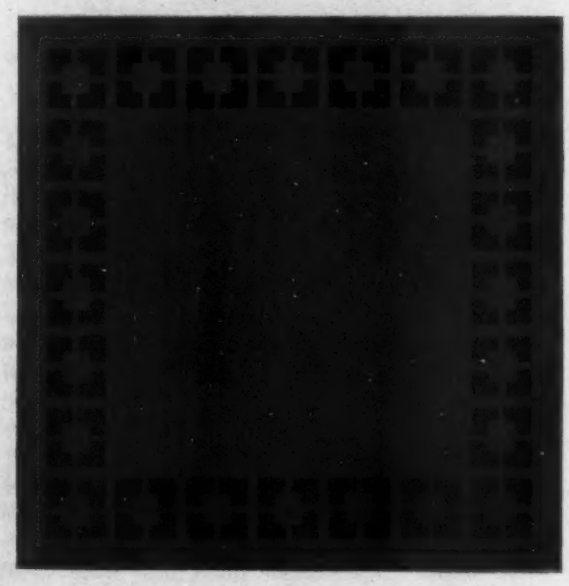
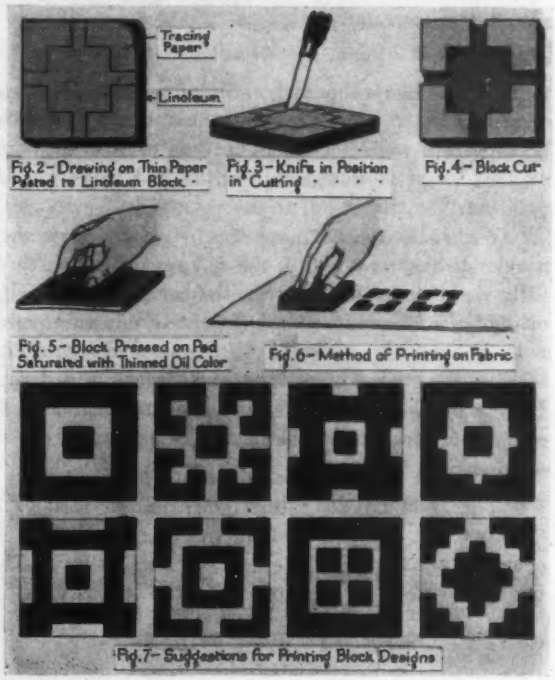


Fig. 1—Table Mat of Felt.


Tracing Paper
Linoleum
Fig. 2 - Drawing on Thin Paper Pasted to Linoleum Block
Fig. 3 - Knife in Position in Cutting
Fig. 4 - Block Cut
Fig. 5 - Block Pressed on Pad Saturated with Thinned Oil Color
Fig. 6 - Method of Printing on Fabric
Fig. 7 - Suggestions for Printing Block Designs

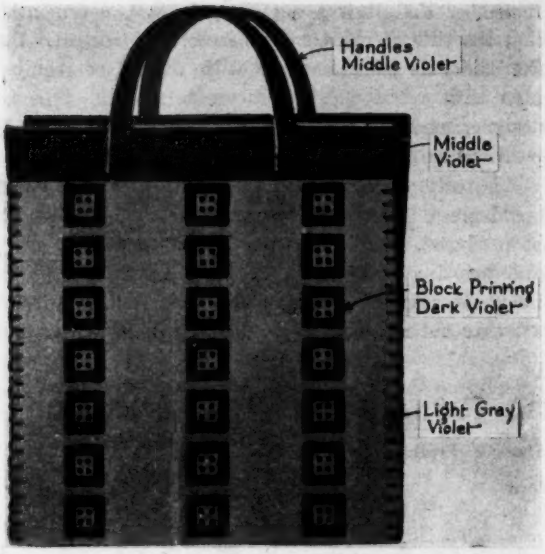


Fig. 1—Shopping Bag.

paint. The block should be pressed firmly upon it, as shown in Fig. 5. Several impressions should be printed on a piece of waste felt, until an even print of all parts of the design is secured. Use the pad between each printing.

With a sharpened piece of white chalk draw with a ruler two squares within the felt square. Plan carefully the distance left between the border and the edge of the felt. The distance between the two drawn squares must be the width of the block, or unit of design. Fig. 6 shows the process of printing the border. Fig. 7 suggests a number of designs, any one of which may be easily cut from a small block.

A Block Printed Shopping Bag.

This shopping bag is strong and serviceable, is quickly made, and is most attractive in appearance. Felt seems to take the print in a most satisfactory way. The impression does not obscure the fabric, but permits interesting flecks of background color to show thru the paint. Thus the printed design becomes a part of the fabric.

The size of this bag may be adapted to its intended use. In making the model here illustrated (Fig. 1) a piece of light violet felt, 12 by 24 inches, was selected. Two pieces of stiff cardboard, each 2 by 12 inches, (Fig. 2) were cut and inserted in a case made of a strip of darker violet felt, cut 5 by 13 inches. These cases were machine stitched to each side of the top of the bag, the cardboard strip inserted in each, and the ends of the felt turned in and overhanded together. Then before the sides of the bag were buttonholed together the design was printed so that both sides of the bag would be decorated alike. Dark violet oil paint, made thin by the addition of gasoline, was used in printing the striped decorations. White chalk guide lines, which could be

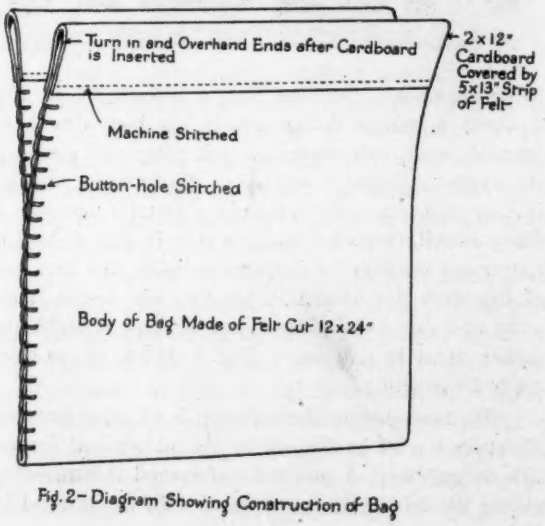

Turn in and Overhand Ends after Cardboard is Inserted
2x12" Cardboard Covered by 5x13" Strip of Felt
Machine Stitched
Button-hole Stitched
Body of Bag Made of Felt Cut 12x24"

Fig. 2—Diagram Showing Construction of Bag

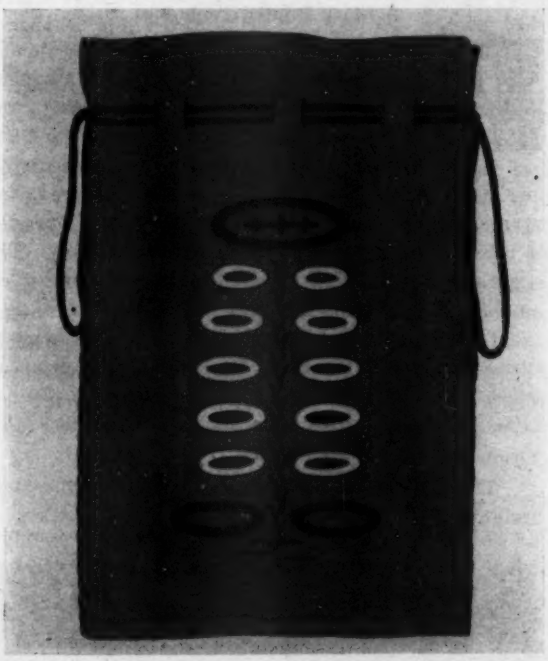


Fig. 1—Small Felt Bag for Handkerchief.

brushed from the felt when the printing was complete, were used to keep the stripes straight. Strips of felt about an inch wide, middle violet in color, were sewed firmly in place with stout thread, to serve as handles. The sides of the bag were then stitched together with violet Germantown wool, using the decorative buttonhole or blanket stitch. Fig. 2 shows all the steps in the construction of the bag. Fig. 1 gives the color scheme and the decorative design of this model.

A Small Felt Bag for Handkerchief or Work.

Edges of felt do not fray or ravel, hence hemming is not necessary when using this attractive fabric. That form of decoration known as applique embroidery can, therefore, be easily and effectively used in combination with stitchery. Sometimes it is best to paste these ap-

pliquéd decorations in place, but a stitch or several stitches should always be used finally to indicate that a form of needlecraft was employed for the purpose of holding the appliqued shapes in place.

Fig. 1 shows a small oblong bag, made of a piece of green felt, cut 5 by 14 inches. Light rose, black and white were used for the decoration, which was placed on one side of the bag only. The design was first worked out in colored papers, so that the color effect could be studied and the patterns for the small leaf and flower shapes could be planned. In this preliminary design all stitches were expressed by the drawing. When the actual material was cut into these small shapes, they were first pasted in place, to secure symmetrical balance. The stem was indicated by feather stitching (Fig. 1). Three pairs of vertical incisions were cut near the top of the bag so that a cord or narrow strip of felt could be slipped thru. The cord served the double purpose of draw string and carrier. Fig. 2 shows a different design, where only two pieces of felt were used in the decoration. The white flower shape was held in place

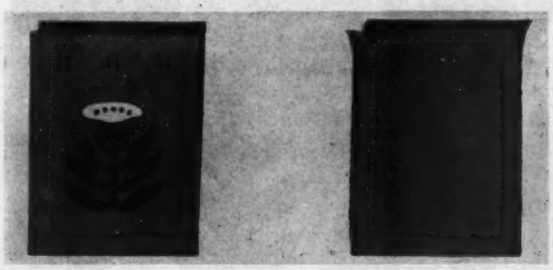


Fig. 2—Piece of Felt 5-in. x 14-in Showing Design in Applique and Wool Embroidery.

Fig. 3—Sides of Bag Buttonholed With Germantown Wool.

by a row of French knots, made with black Germantown wool. The pattern for this design was cut on folded paper. Fig. 3 shows the sides of the bag buttonholed together, nearly to the top.

The charm of this problem, which can easily be worked out in a sixth grade, lies in the selection of a variety of interesting color schemes.

Another Hand Bag Decorated With Felt Applique and Wool Embroidery.

This is a delightful problem for girls in high school classes. It is silk or satin lined and shows an interesting use of wood panels, which might be prepared by boys in the manual training department. Fig. 1 shows the bag completed, the strips of wood held in place by the lacing of strong silk cord. Such a bag as this is easily worth from eight to ten dollars, when well made of a good quality of felt, and showing a fine decorative design in a beautiful scheme of colors.

The design should first be sketched in pencil, then expressed in colored papers. Thus there will be no waste of precious material and no uncertainty as to the assembling of the parts of the design. Too many small pieces will result in fussiness. A few rather

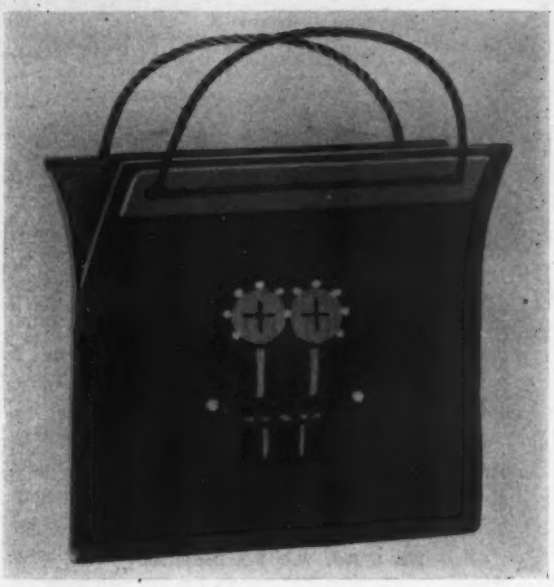


Fig. 1—Felt Hand Bag Decorated With Applique and Wool Embroidery.

large shapes, harmoniously arranged, will give a better effect.

The body of the bag is made of felt cut 10 by 18 inches. Use a good background color, such as black, gray, dark blue, gray-green or gray-violet. The decorative design is to be appliqued to this felt first of all. In Fig. 2 eight small pieces of felt were used to express the flower arrangement in the bowl, the scroll under the bowl being outlined in black Germantown wool. All the shapes were first pasted in place, then secured by a stitch or stitches. French knots of white were used on the bowl shape. One long stitch was used on each stem element, and stitches to suggest a midrib and one or two veins were used on the leaves. The flower shapes were attached by running stitches set near the edges. All this stitchery is to be done with Germantown wool,

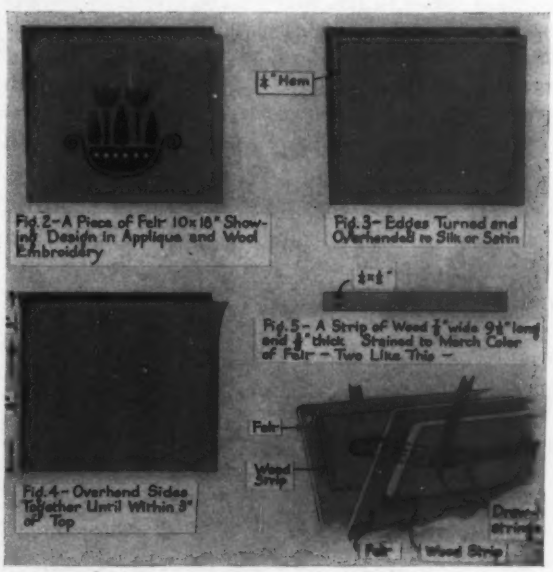

¼" Hem
Fig. 2–A Piece of Felt 10x18" Showing Design in Applique and Wool Embroidery
Fig. 3– Edges Turned and Overhanded or Silk or Satin
Fig. 5– A Strip of Wood ¼" wide 9½" long and ¼" thick Stained to Match Color of Felt – Two Like This –
Felt
Wood Strip
Fig. 4– Overhand Sides Together Until Within 3" of Top
Drawstring
Felt
Wood Strip

Fig. 1—Hats With Felt Decoration.

its color to be determined by the color scheme selected. Satin or silk lining of black or of a tone to harmonize with the felt is cut the same size as the outside of the bag. To strengthen the sides, the felt is turned in and overhanded to the lining (Fig. 3). The sides are then overhanded together with stout sewing silk, matching the body of the bag in color. The sides are left open at the top for a space of about three inches (Fig. 4). Fig. 5 gives the dimensions of the strips of wood which must be stained or painted to match the color of the felt. They are to be pierced at each end with holes large enough to permit the cord to pass thru twice, in lacing. Notice that the strips of wood are placed on the outside of the bag and that the cord which holds them in position is strong enough to be used for handles.

Outing Hats With Felt Decorations.

Perhaps the crowning exercise in the decorative use of felt is found in the trimming of a hat. What girl ever had a sufficient number of hats to satisfy her needs in the "outing" season? The ten-cent-store hats of plaited straw are quite suitable for this problem. Each girl can choose a becoming shape as there are several good styles available. Fig. 1 shows two examples. In a class of fifty students in a normal school each hat was a credit to its trimmer. There was not a single failure. How was such a result made possible? Two requirements were made of each student, first, that she should trim the actual hat with colored papers, pinned on as the felt shapes were to be sewed on, and criticised from the standpoint of good design. Second, that the colors used should bear careful analysis, with relation to a color chart. The same care was exercised in the selection of intense colors, values and balancing neutrals that would be observed in planning a room interior, a costume or a poster. The results, therefore, were not accidental. The designs were carefully thought out and developed. There were certain restrictions in the number of colors available in felt, but in working out the designs in colored papers the limitations of the colors of felt were borne in mind. Figs. 2 to 9 show a number of elements that were used in planning the decorations. The use of wool stitches is plainly indicated in this group. Fig. 10 shows one of the many combinations that were assembled, and two more arrangements are illustrated in Fig. 1.

Fig. 10 — A Combination of Felt Shapes to Form Hat Ornament

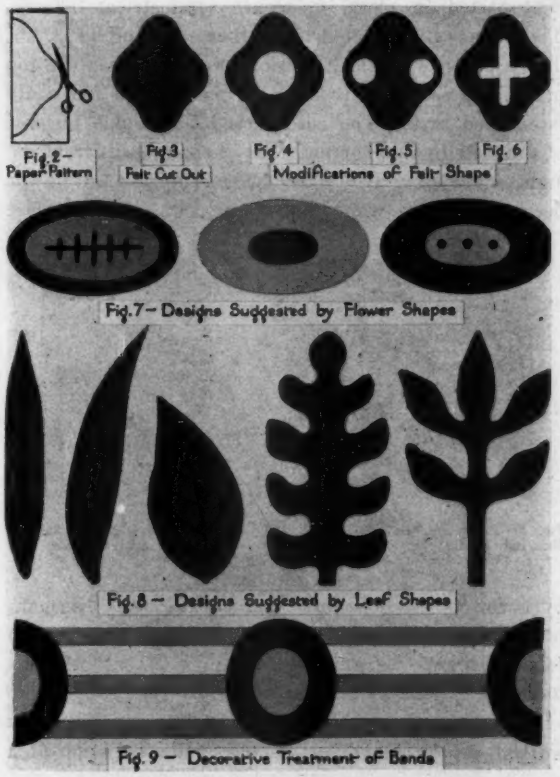


Fig. 2 — Paper Pattern
Fig. 3 Felt Cut Out
Fig. 4
Fig. 5
Fig. 6
Modifications of Felt Shape
Fig. 7 — Designs Suggested by Flower Shapes
Fig. 8 — Designs Suggested by Leaf Shapes
Fig. 9 — Decorative Treatment of Bands

The lessons in felt should suggest to the art teacher that there are many mediums besides paint and paper thru which color and design may be studied. Too long have we been restricted to abstract materials in our effort to teach art. Let us learn to express our ideas of beauty in terms of utility. A hat may be as truly artistic as a study in paint. *The hat is likely to reach a thousand people where the sketch or the painted design would reach but one.*

JOB ANALYSIS—WHAT IS IT?

Leon S. Green, Professor of Manual Arts, University of Wisconsin

JUST now "Job or Trade Analysis" is more popular thruout the country than ever before. This is due in a large measure undoubtedly, to its use during the stress of war. I have been present on one or two occasions when the matter was explained to a number of men, preparatory to suggesting that they spend some time in studying it, and in each case when they were asked to discuss the advisability of forming a class, there was little said. It seemed to me, at the time, that they could not quickly determine, or understand just what trade analysis is or attempts to be. There was a tendency to make it a more complex subject than it really is, and, as is especially natural with men in the trade who have long since been separated from school days, to think that they were incapable of mastering it. Also, there was evidence that they did not, in many cases, see how it could be applied to their particular business, trade or profession.

This observation tempts me to give a definition of what I think job analysis is, perhaps illustrating with a point or two that will be applicable and understandable, hoping that I will "draw out" some discussion on the matter, that will be of interest to all who read this article.

Trade analysis is the shredding, organizing, systematizing and recording or tabulating of knowledge that may be in one's possession. It is not an attempt to give you new facts. Many people know quite a bit about some one subject, but because they have never seen that information actually written down, "they do not know what they know." When one makes an analysis, he takes an inventory of what he knows. By shredding, I mean tearing the subject into bits, large and small, which can be organized and systematized according to some scheme (explained in a subsequent paragraph) and recorded in such a way that the owner can easily pick out and use, at any time, any part of the whole that he may wish.

The advantage of all this is obvious. Nearly everyone, at some time in his life, has needed to, or wished to, impart knowledge to someone else. That, of course, is what the teacher does, but there are also many others who should have their knowledge so arranged and tabulated that they can determine and pass out, with little danger of mistakes, and with little loss of time, any information which they have upon certain large subjects about which they are supposed to be well informed. So, we should see that "Job Analysis" is not the process of teaching one something new but rather that of determining and organizing that which one already knows.

Let me illustrate with a homely example: Most of us at some period of our life, have been exposed to the workings of the family kitchen where the food is prepared. Because of this fact, I am picking out the subject entitled "Preparation of Food" because it is, perhaps, more common to all readers of this magazine than any other subject, equally fitting, that I could think of.

There are a variety of processes in "preparing food", simple and complex ones, some requiring quite a bit of related information and some requiring hardly any. You might begin to make this art familiar to the amateur by having him (or her) make an angel food cake. Perhaps, instead, you would have him put some water on to boil and put in potatoes to be cooked. Unquestionably, this latter task is less difficult than the former and involves simpler related information. It must be agreed, also, that the more logical way of informing the person about "preparation of food" would be to give him the less difficult task or job, with the simpler details, steps and processes, first. After the learner has mastered the simpler job, he would undoubtedly be given a little more difficult one, and when this was finished, a still more complex one would be given him and so on until he was completely trained. That the person doing the instructing may be sure he is giving the learner the jobs in the proper order, he should make a list of all the jobs he thinks it desirable the learner should be taught to accomplish. Then he should arrange and tabulate these in such a way that, at any time during the learning process, he can determine and find listed the proper job for the beginner to work at next.

In instructing a person, there is nearly always some extra information that you think he should know, that will help him in performing his task. To illustrate: There are at least two ways of making pancake batter. One recipe calls for sweet milk and baking powder and the other for sour milk and soda. The processes of mixing the two kinds are nearly alike. The flour, salt and baking powder or soda is mixed together dry and then stirred into the liquid which is the sweet or sour milk. However, the learner should know more about the batter than just how to sift the ingredients and stir them into the milk. He should know *why* baking powder is used in one case and soda in another. He should also be able to tell when he does not have quite the right proportions of these ingredients. In "job analysis" this knowledge, which you think it desirable for him to know, is called *"related information."* This would also be recorded in your tabulated system and in such a way that you will remember to teach it, can find it, and will use it at just the right time to aid the learner the most.

As stated above, the subject being analyzed (in this case "preparation of food") is broken up into pieces. The big pieces or divisions are picked out first and

listed. Under each large division are placed the sub-divisions. Let us take the above subject and break it up. The large divisions are perhaps A, B, and C as follows:

A—Baking B—Boiling C—Frying Etc.

1. Cakes.
2. Pies.
3. Bread.
4. Potatoes.
5. Cookies.

Etc.

Under each big heading, as *"A—Baking"* above, will be listed all the jobs that would naturally fall in *this division* of the whole subject or trade. Careful consideration, of 1, 2, 3, etc., above under *"baking"*, seems to show that some of these jobs are more difficult than others. I profess no knowledge of cooking, but I believe that it is easier to bake potatoes than bread or cake or cookies. I also believe that it is easier to bake cookies than bread or cake. So if these tasks were to be taught in order of difficulty, they would need to be re-arranged and put into an "instructional order." I have simply listed them in the order in which they came to my mind as I write.

With each of the above sub-divisions, 1, 2, 3, etc., would be associated other needed knowledge or related information. It might be something that was not actually done with the hands but which should be included in the learner's fund of information on the subject. In the case of "4-Potatoes" such information might be "How hot to have the oven?" and "Should potatoes be baked with skins on or off, whole or halved?" etc. While such knowledge may not be part of the baking process, it is essential that the learner get it, and that it should be recorded and put where it can be used at the appropriate time in teaching.

I shall not go into greater detail. The above is sufficient to show what "job analysis" aims to do and to show that a person does not know how much he knows about a subject until he makes a written inventory of his information on it. The most complete treatise published on this subject, so far, is the book "The Instructor, the Job and the Man", by Chas. R. Allen, published by J. B. Lippincott Co. Besides giving much space to job analysis, it also treats, in detail, the methods of teaching industrial subjects.

I hope these notes will encourage some who, because of the somewhat technical term "Trade or Job Analysis", have feared they were incapable of grasping the contents and methods commonly used in teaching one how to inventory his own knowledge. Anyone will profit by studying the general principles and applying them no matter what his or her profession. My advice is "Take a chance—expose yourself to it."

Machine Shop Mathematics For The Trade School Boy

G. Raymond Tuttle, State Trade School, Meriden, Conn.

It is well recognized that the chief problem of the instructor in "related subjects" in trade schools is to give the students such instruction as will help them in their trade work. In the small amount of time allowed a boy in the machine shop courses, at least two lines of related instruction seem worth while: (1) Mathematics of the machinist trade, and (2) Some academic work in spelling, general science, industrial geography, recent history, and economics. The present paper considers the mathematics of the machinist trade.

A practical method of teaching mathematics is to prepare a carefully studied series of typical problems which are likely to arise in the boy's work in the trade. A summary can be prepared of all operations in the machine shop that require any calculating. The work can readily be outlined under typical machine headings.

With this as a basis, the instructor can write out all the types of problems that usually occur with each kind of machine work. For instruction purposes, all problems must be arranged in the order of difficulty and in accordance with their probable frequency of use. The resulting material constitutes an outline which makes a good working synopsis of the course.

Following along such an outline as many problems as are desired may be written. One effective way of working is to group five or six problems of the same type on a sheet. Problems made up on this basis will each have to do with the real shop job and as a subject they cover the practical field of machine shop mathematics very completely.

On the following pages is a suggestive outline of machine shop work in which mathematics has been given consideration. Following it is an outline of a detailed course in machinist's mathematics which may be used as a basis for writing out problem sheets. There is also a list of problem sheets covering the first three topics of the machinist course outline.

In practice, the list of problem sheets is used in this way: New boys are received into the school every week or two. Boys having no more than five grades of instruction at the age of 14 years are obviously in need of review. To afford this review, six or eight sheets of the easiest problems of the first group are placed in a handy notebook under the boy's name. The sheets are given to the boy, one at a time, and the boy works as an individual with the instructor's personal assistance.

From the way the boy has done his first six or eight sheets, the instructor can gauge the boy's ability somewhat and pick out the remainder of the problems in the first group in the order that would best develop the boy in his trade. The boy does the simplest trade

mathematics problems first, preparing himself to do the more difficult ones to follow next. Sometimes it may be necessary to give a few special groups of problems for practice.

Should a new boy be bright and ambitious, three problems on each sheet may be enough. On account of the similarity of several sheets, it may be sufficient for the boy to work only ten or twelve of the most difficult sheets in the first group. The best interests of the boy must be sought by the instructor.

The average boy (grammar school graduate) should be able to cover work up to, and including, topic No. 15 on the outline on the machinist's course in mathematics, "Cutting and Grinding Speed Calculations."

Following is a suggestive outline of work in machine shop mathematics:

Suggestive Outline of Work in Machine Shop Mathematics.

State Trade School, Meriden, Conn.

1. *Cutting off machines and automatics.*
   - a. Cutting up bar stock.
   - b. Making screws, collars and round articles from bar stock.
2. *Bench work.*
   - a. Drill size and reaming.
   - b. Tap drill and die work.
   - c. Snap gauges and size blocks.
   - d. Reading scale to 64th and changing to thousandths.
   - e. Chipping, filing, scraping.
   - m. Measuring accurately.
3. *Turning and boring.*
   - a. Turning a straight arbor.
   - b. Turning on arbors, fits.
   - c. Face plate work and chuck work. Truing up and measuring.
   - d. Judging clearance angles in tools.
   - g. Speed of cutting.
   - h. Turning tapers.
   - i. Screw cutting.
   - m. Judging clearance angles in tools.
   - t. Boring holes to correct size and location.
   - u. Setting boring tools.
   - v. Measuring for set ups on boring mill.
4. *Drilling.*
   - a. Feeds of drilling.
   - b. Cutting out stock on drill press.
   - m. Grinding drill.
   - n. Speeds of drilling.
   - o. Drilling hole to size and location.
   - p. Counterboring, tapping, spot facing, etc.
5. *Planing and shaping.*
   - a. Setting up work on table.
   - b. Sharpening of tools.
   - c. Judging angle clearance.
   - m. Planing flat square surfaces.
   - n. Measuring slots, grooves and angular surfaces.
6. *Milling machine.*
   - a. Milling cutters.
   - b. Vertical milling attachments.
   - c. Set ups on milling machines.
   - d. Milling and measuring flat surfaces.
   - m. Speeds and feeds.
   - n. Milling and measuring slots and angular surfaces.
   - o. Boring on a milling machine.
   - p. Gear cutting.
   - q. Driving head.
7. *Grinding.*
   - a. Set ups on grinder.
   - b. Straight grinding.
   - c. Cutter and reamer grinding.
   - m. Grinding feeds and speeds.
   - n. Taper feeds and speeds.
   - o. Precision measurements.
   - p. Automobile grinding work.
8. *Forging and blacksmithing.*

Detailed Outline of Machinist Course in Mathematics.

1. *Fundamental operations*—including addition, subtraction, multiplication, division and decimals, as much as the student needs.
   - Cost problems on equipment.
   - Time problems on drill feed and surface planing.
   - Short methods useful in figuring.
   - Determining plug fits from handbook data.
   - Determining the correct size of size block from corrections.
   - Determining the largest and smallest gage size from its limits.
2. *Fractions.*
   - Finding the over-all dimension.
   - Decimal equivalents of fractions.
   - Changing to common denominator.
   - Cancellation, method and purpose of.
   - Calculating reamer drill size.
   - Calculating drill size to use before boring a hole.
   - Finding center distance between plugs.
3. *Powers and roots.*
   - Problems to square and find the square root of numbers, knowing two sides of a right triangle, to find the third side.
4. *Ratio and proportion.*
   - Speed of both pulleys when only one speed and pulley diameters are known.
   - Diameter of both pulleys when only one diameter and speed of both shafts are known.
   - Gearing calculations on index head or lathe.
   - Speed relation calculated when gear is part of a train of gears.
   - Percentage applied to practical problems.
   - Power efficiency problems.
   - Problems showing the influence of speed upon feed in feet per minute.
5. *Weights and measures*—Problems involving the use of (long measure) the different units in the following:
   - Square measure.
   - Cubic measure.
   - Weights of materials.
   - Liquid measure.
   - Fahrenheit—Centigrade thermometer comparison.
   - Transportation weights and costs.
   - Specific gravity of materials of construction.
   - Use of wire size table to find drill size.
6. *Mensuration.*
   - Finding distance between slots, holes and buttons from drawing dimensions.
   - Area of sheet metal to make a tank bottom.
   - Area of cross-section of hexagon, octagon, and round-steel.
   - Triangle area.
   - Quantity of oil in tanks.
   - Volume of steel or iron per foot of pipe.
   - Cubic contents in steel flat pieces.
   - Cubic inches per foot of hexagon, octagon and round steel.
7. *Thread and screw measurements.*
   - Sizes to grind threading tool for threading:
   - U. S. Standard thread.
   - V. thread.
   - Acme thread.
   - Square thread.
   - Worm thread.
   - Figuring tap drill sizes.
   - Mathematics of the micrometer.
   - Sizes of wires to measure thread sizes.
8. *Pulleys and belting.*
   - How to measure a belt in theory and practice.
   - Pulleys to use to obtain desired speed of shafting.
   - Power transmitted by belting.
9. *Horse Power*—Problems and explanations on the following work equals force times distance thru which force acts.
   - Power necessary to drive shafting.
   - Loss of power by friction.
   - Work of lift pump.
   - Steam engine horsepower calculation.
   - Gas engine horsepower calculation.
   - Electric horsepower calculation.
10. *Formulae.*
    - The solving of many useful formulae is shown and transportation is explained so that any unknown quantity may be found.

Formulae on the following:
Horsepower.
Pulley speeds.
Lever formulae.
Formulae on gearing the circle.
Areas.
Volumes.
Simple trigonometery.
Simple mechanics.
Thread measurement.
Distance across flats of a square or hexagon.
Largest square or hexagon that can be made on shaft.

11. *Solution of a right triangle.* Problems or explanations on:
Method of squares.
Parts of a right triangle.
Six principal relations between the sides of a right triangle.
Numerical value of sine, cosine, etc.
How to use the sine, cosine, etc.
Find all the parts of a right triangle if one side and one other part be known.
Use of right triangle to figure dimensions in simple problems.

12. *Machine shop problems*—elements on gearing—calculations to find:
Change gears in lathe, miller, drill press.
Gear blank sizes.
Gears on index head.
Gear series for lathe.
Simple and compound gearing.
Bevel, worm and spiral gear, size and speed.

13. *Drilling machine problems.*
How to find the correct drill speed for all sized drills.
Relation of size of hole to drill speed.
Relation of high speed drill speed to carbon drill speed.
Relation of size of hole to drill speed.

14. *Taper work.* Problems to figure:
Taper per inch and per foot.
Size of any part of the taper.
Angle of taper.
Setting of taper attachment.
Amount to offset center when turning taper.
Taper gauge setting.

15. *Cutting and grinding speed calculations.*
Tape, thickness gauge marking.
Speeds of lathe for proper cutting.
Speeds of grinder for proper grinding.
Effect of increasing the size of a pulley.
Effect on cutting speed of increasing the diameter of work.
Proper speeds on different kinds of metal.
Surface speed—external, internal, flat, milling.
Cutting speed of milling cutters.
Threading speeds for dies.
Range of lathe speeds needed.

16. *Fundamental machines.*
(a) Lever—Calculation showing advantages of the following machines:
Crow bar.
Arbor press.
Platform scales.
Sheer.
Compound lever—indicator.
(b) Jack and screw—Calculations showing advantage of the following machines:
Automobile jack.
Horse jack.
Paper press.
Vise screw.
Milling machine table elevating screw.
(c) Wheel and axle calculation where in use for moving buildings.
(d) Block and tackle calculations.
Mechanical advantage obtained.
Power necesary with 2, 3, 4, 5, or 6 rope tackle differential blocks and tackle power calculation.
(e) Inclined plane—work done as applied to conveyors.
Inclined passageways.
Power to climb hill.
Adjustable parallel—relation between height increase and distance moved.
(f) Wedge—Calculations showing immense stresses obtained by means of wedge force and power used.
Stresses caused by mandrel or arbor.
(g) Miscellaneous problems showing motion obtained by links and levers.
Relation of lever length to speed.
Motion of auto spark and gas control levers.

17. *Strength of materials*—Calculations from tables on:
Safe tension for materials.
Safe compression for materials.
Power necessary for sheering of bolt.
Strength of simple beams.
Elasticity of metals.
Power for power press blanking dies.
Strength of wire.

18. *Geometry*—Construction and explanations on the following:
Layout of circles, squares, hexagons, triangles.
Caliper play for allowances.
Angles to set compound rest, universal vise, level gear.
Angle of threads.
Angle of spiral cutters.
Cam layout.

Complex machine problems—
In the topics following, diagrams are made from the machine itself. The speeds, feeds, gearing and power calculated.

19. *Drill press.*
20. *Lathe.*
21. *Planer.*
22. *Shaper.*
23. *Grinder.*
24. *Machine (Milling).*
Index head mechanism.
Graduating a scale or dial.
Spiral milling—calculations for setting up the job.
25. *Trigonometry.*
The use of logarithms.
Explanation of the parts of a right triangle used in trigonometry.
The relation between the parts of a right triangle.
Right triangle problems:
How to find the unknown side or angle when one side and one angle is known.
How to find the unknown side or angle when two sides are known.
Calculations and use of the sine bar.
The formulae on the oblique triangles used in problems.
Finding the unknown side or angle when one side and two angles are known, and when two sides and the included angle are known.
Figuring diameter of odd toothed cutter.
Calculating distance between holes on a circle.
Theory of tooth rest position when grinding cutters.
Practical problems.
26. *Mechanics*—Simple calculations and explanations illustrating the following:
Pressure angles on gearing.
Energy of blows.
Momentum of fly wheel.
Turning and bending movement.
Why speed of shaper is uneven.

Problem Sheets.

91 Short processes explanation.
92 Arithmetic review.
93 Fractions No. 3.
94 Fractions No. 4.
95 Decimal sheet No. 1.
96 Drill size for reaming.
97 Drill size for boring.
98 Turning up and measuring (indicator).
99 Fits on shafts and bushings.
99A Fits on journals and bearings.
100 Disc grinder countershaft wts.
101 Fundamental operations.
102 Fundamental operations.
103 Disc grinder casting (weights).
104 Countershaft castings (machining time).
105 Cost of disc grinder pedestal.
106 Percentage explanation.
107 Fundamental operation (per cent problems).
108 Fundamental operation (cost).
109 Fundamental operation (miscellaneous).
110 Cost data on equipments.

111 Drill feed and surface planing.
112 Gauge size and limits.
113 Machine shop equipment problems No. 1.
114 Relation and percentage questions.
115 Size blocks.
121 Distance across corners of square.
122 Distance across corners of hexagon.
123 Center distance between plugs.
131 Right triangle—square and square root.

MODEL 26″ and 36″ MOTOR BOAT

J. W. Cavileer, Montclair, N. J.

THE construction of the motor boat, so far as the hull is concerned, is more difficult than the sharpie or yacht. The metal parts, however, are not quite so complicated.

These little crafts were very popular last year at races arranged by the Montclair Schools, and drew a great crowd as the pictures show. The boats were provided with all the details of finish and equipment that go to make model motor boating a source of real pleasure and recreation.

They have the same lines that a large boat, probably 75 feet in length, would have. Much care is taken and a great amount of emphasis is placed on this particular point.

It takes about a half school year to complete either type, but even so they are worked out on a commercial efficiency basis, therefore it is not exploiting the boy. The boy gets nearly all the lines of shop activities such as soldering, the use of taps and dies, sheet metal work and other metal work. The woodwork comprises the use of the many tools in a shop.

A great deal of care must be taken in shaping the hull for altho there are lines to go by, much depends on the eye. The larger or 36″ model is constructed from a piece of white pine 4″x8¼″x36″ and the smaller or 26″ scout model is made from a piece of the same kind of lumber 4″x6″x26″.

The cabins are merely suggestions and may be rearranged according to the idea of the boy or instructor in charge.

The scout may be equipped with an automobile top, the bows of which can be made from 3/16″ half round reed and the cover from light brown linen.

Fig. 1—Some of the Prize Winners.

There may be room for discussion about the placement of the motors. It will be noted that in the drawings they are placed well forward, thus allowing the propeller shaft to be more nearly parallel with the bottom of the keel, and also to make room for two dry-cell batteries to lie one on either side of the shaft, and placed so as to more equally balance the boat when afloat.

The author recommends the use of a motor weighing not more than sixteen ounces and not higher than 3¼ inches, equipped with a reversing switch. The motor must be well designed both electrically and mechanically and wound for battery current only. It should be possible to run it at full efficiency on two or at most three dry-cells. It is desirable that the motor be made reversible and that it be possible to reduce the speed.

The writer has used a motor which has field pieces of very good wrought metal. The armatures of this motor are of charcoal iron laminated and well balanced.

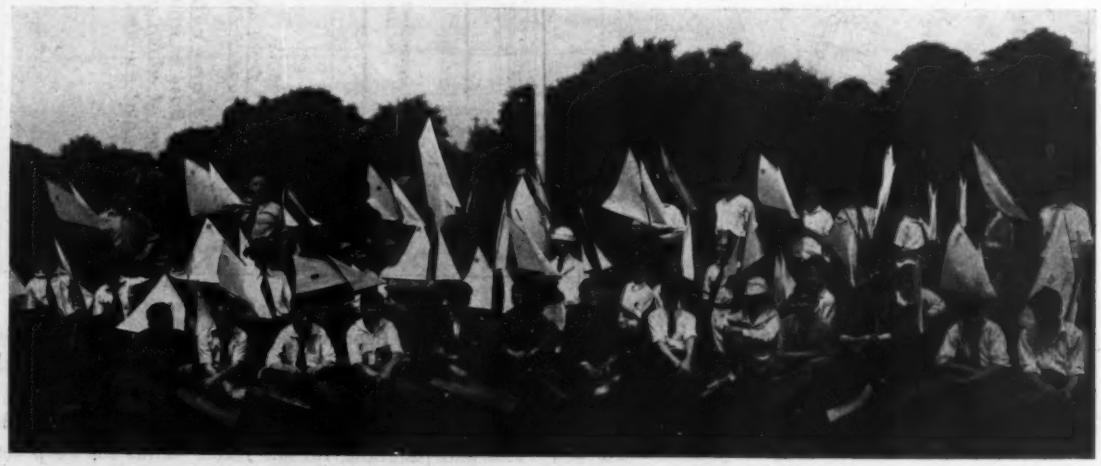
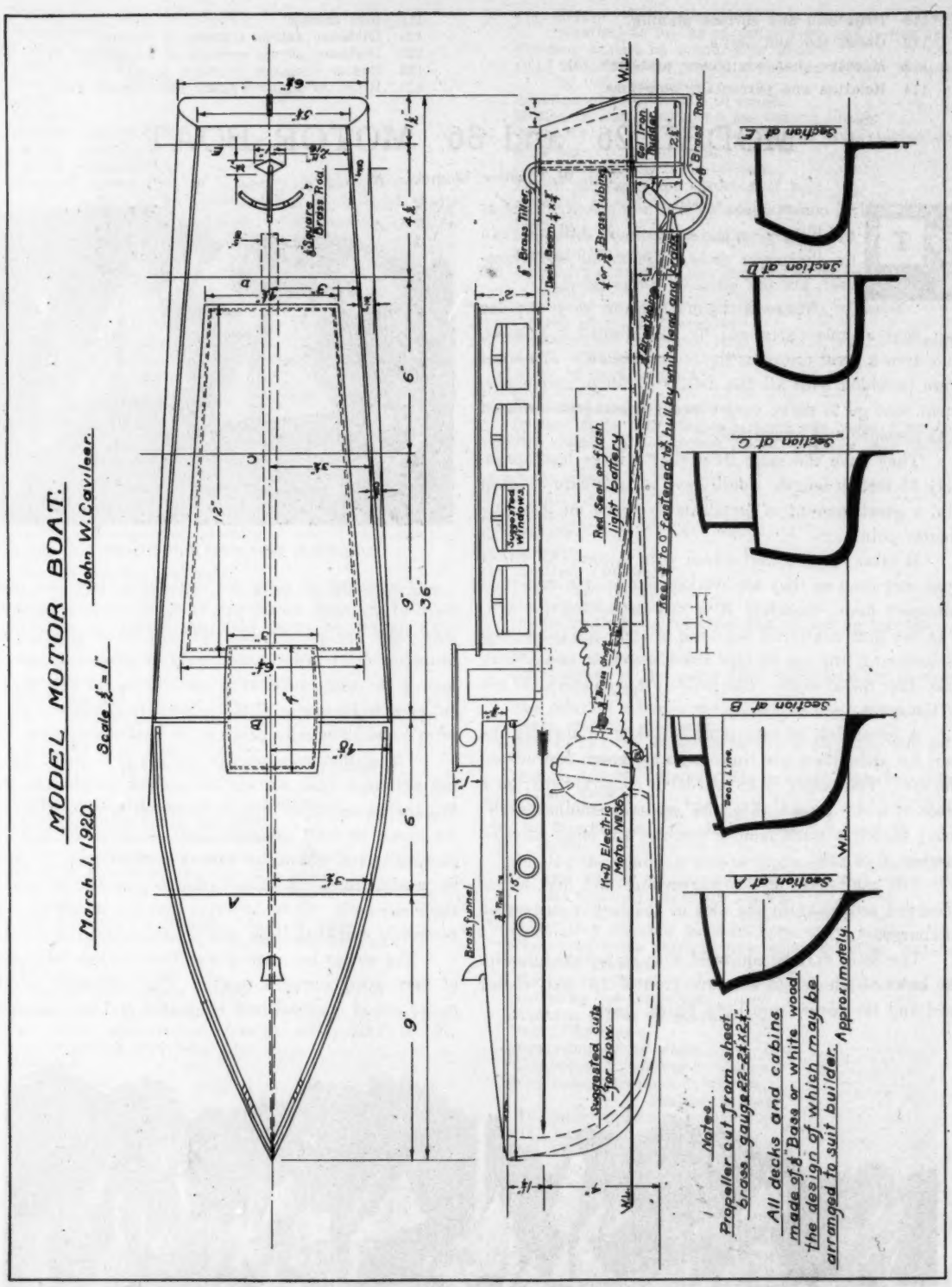


Fig. 2—A Small Group Assembled After the Race.

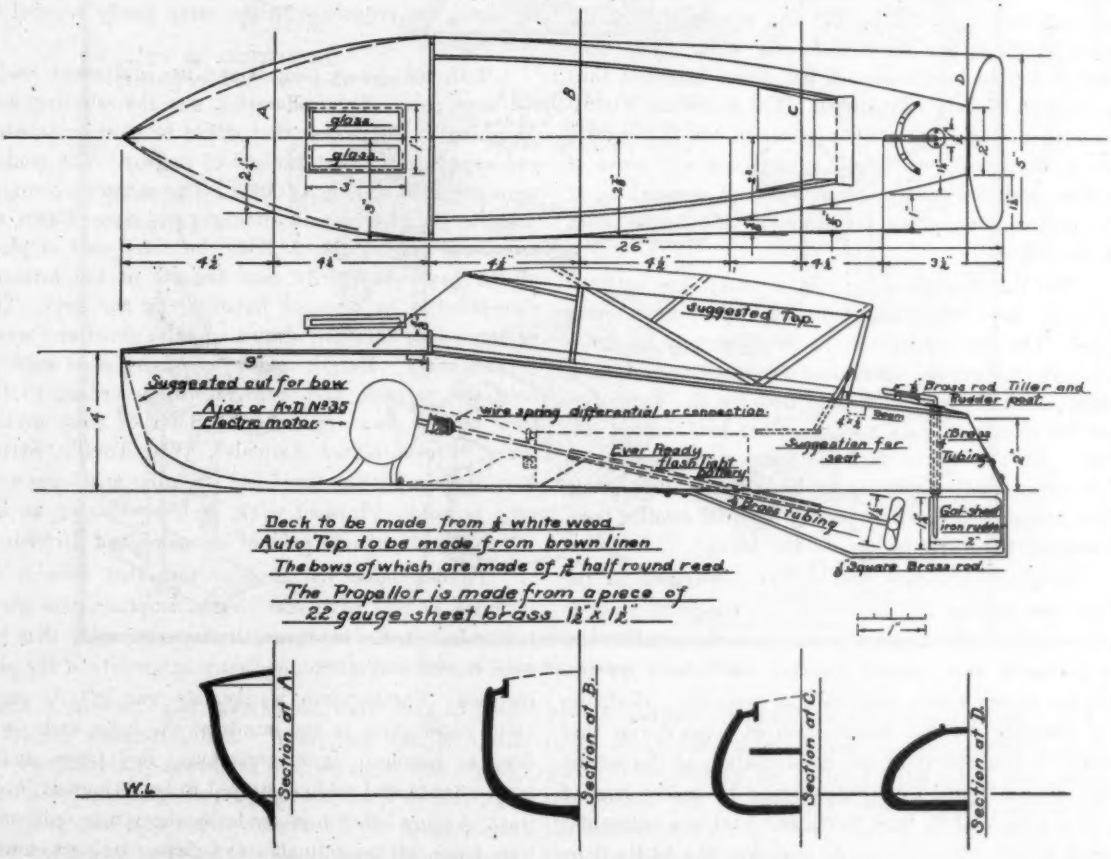

MODEL MOTOR BOAT.
March 1, 1920. Scale 1"=1' John W. Cavileer.
Section at E
Section at D
Section at C
Section at B
Section at A
Notes.
Propeller cut from sheet brass, gauge 22-2½x2½.
All decks and cabins made of ⅛" Bass or white wood. the design of which may be arranged to suit builder. Approximately.

The brushes are self-adjustable making the motor very effective for the purpose intended.

The speed obtained varies from six to ten miles an hour, according to the pitch given the propellers.

In connection with the construction of the boats, essays and descriptions were written in the English class. The cost of the materials was calculated in the mathematics department, and the shipping problems were discussed in the geography class. The art class drew sketches of a finished model for the front of the school paper, and the print shop printed posters, schedules and programs for the races. Thus the shop correlated its work with other school activities.

Fig. 3—The Start of the Motor-Boat Race. Note the Wake or Churning Motion of the Water Caused by the Propellers, also the Enthused Crowd Along the Shore of the Lake.



Details of 24-in. Motor Boat. Designed by Mr. John W. Cavileer.

The Boys and a Few of Their Products.

TOYMAKING AS A SUMMER ACTIVITY

Michael Carlton Dank, Instructor Manual Arts, Brooklyn, N. Y.

DURING the past two summers, the author of this article conducted classes in toymaking at a boys' summer camp, situated at Highmount, in the Catskill Mountains, New York. The problem at hand was to teach toymaking to about 75 boys whose ages ranged from 7 to 15 years and to most of whom the work was entirely new. A playhouse, ordinarily used for rehearsals and club meetings, well-lighted and separated from the main building, was devoted to the work. The time allotted for the completion of the course extended thru the months of July and August. The following is written with the belief that the manner in which the work was planned and successfully carried out will prove of interest and assistance to those who are engaged in, or who are contemplating the teaching of, similar work in the future.

Tho the toymaking activity at camp was optional with the boys, the number that enrolled proved very large. The first consideration, therefore, was to divide the boys into groups convenient for teaching. Accordingly, one-half was assigned to take up the work during the month of July and the other half during August. As two hours each morning were devoted to this camp activity, the larger boys of the July group were assigned to the first period, and the smaller boys, averaging ten years of age, to the second.

Another important step in the preparation of the work was putting the playhouse in a condition suitable for working. To make a practical working table, two long boards were cleated together and placed on two wooden horses which were used as supports. Realizing the necessity for the construction of some device that would be convenient in the manipulation of the coping saw, sixteen boards, each measuring 12 inches long, 4 inches wide, and ¾ inch thick, and having a triangular notch sawed out at one end, were screwed to the long work bench. Care was taken to place the boards at distances convenient for the child at work.

Selection of Toy Models.

As the toymaking classes, during the author's first season at camp, were limited to a great extent to the making of small models, due to the lack of equipment that would permit the making of large toys, a special request was made before the second summer's work commenced for the installation of a double-vised work bench and other necessary tools. Seeing the necessity for same, the proprietor of the camp gladly acceded to this request.

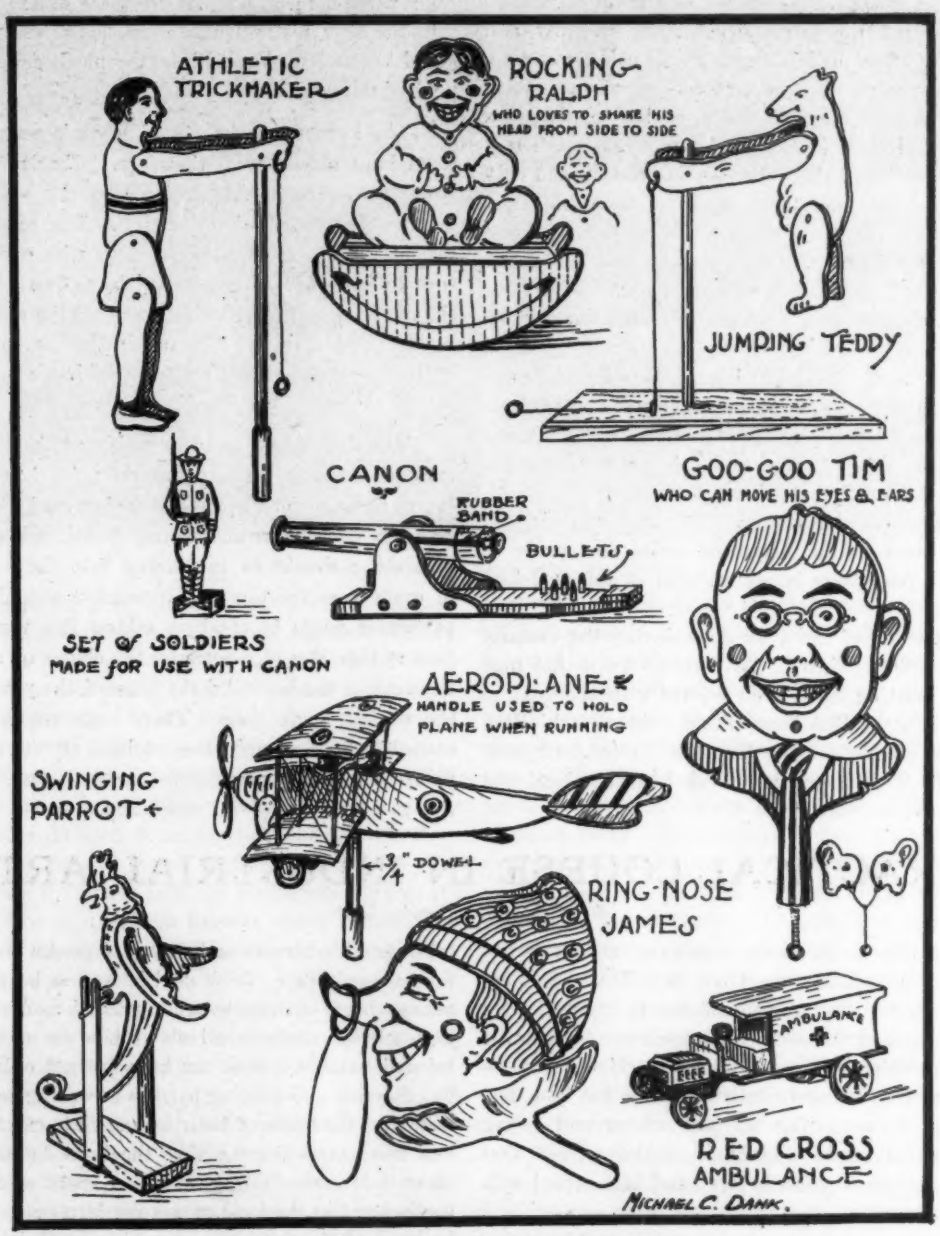
With the classes formed and the equipment ready, the next point of consideration was the selecting and designing of toy models that would be most interesting and appeal to the play instinct of the boy. The models were prepared well in advance. The patterns, containing the complete layout of the toys, were drawn on architects' tracing cloth. This cloth was used in place of the paper ordinarily used because of the former's susceptibility to repeated handling by the boys. The patterns were carefully drawn so as to avoid any waste in the wood. Manilla paper envelopes were used to hold the patterns and were labeled according to the class of toys they represented. Some of these groups were: "Freak-Jointed Animals", "War Toys", "String Moving Toys", "Novelties", etc. Similar envelopes were used to hold unfinished work, each boy having an envelope on which were printed his name and division.

To determine the kind of toys that were to be included in this particular course, emphasis was given to the fact that a boy loves to play with a toy that has some mechanical motion or that is suggestive of the play instinct. Furthermore, as the late war left its many vivid impressions in the minds of the boys, such problems as cannons, guns, aeroplanes, Red Cross ambulances, tanks and soldiers proved to be very great favorites. Among other toys made by the young craftsmen were freak-jointed animals and figures, ring-nose clowns, trickmakers, toy wagons and carts, ring tosses, various kinds of game sets and novelties.

Method of Working.

After choosing their models (which was left to the youngsters themselves) the boys made tracings of their patterns on a one or three-ply board of wood, according to the particular needs of the toy being made. A sheet of black carbon paper was placed between the pattern and wood, and thumbtacks were used to keep the tracing material intact. When this was done, all parts were carefully sawed out with an eight inch coping saw, following along the outline indicated by the pattern. The next step was to smooth off the rough edges of the parts just sawed and then to bore all necessary holes, using either a small sized awl or gimlet bit, according to the needs of the problem at hand. The toy parts were then ready for coloring and decorating A long table was built up against the wall for this purpose, and large tomato cans, obtained from the camp kitchen, were used as paint containers.

Realizing that the attractive feature in a toy is produced by its bright and outstanding colors, the following mixture was used as the color medium. Powdered colors, bought by the pound, were placed in glass jars. When mixing the paint, a little bit of each color was poured into its respective color can and then came the addition of white shellac and denatured alcohol, to thin the color and shellac solution. This mixture proved to be a most pleasing and attractive color medium for the toys, for they seemed very lifelike and the profes-



Some Good Types of Toys for Summer Camp Work.

sional touch was quite evident. The general scheme was first to paint in the light colors and subsequently the darker shades.

Emphasis was placed on the idea of the contrast of light and dark colors. A good feature of this paint preparation, aside from its decorative advantages, is its quick drying quality. As shellac is a main ingredient of the mixture, the colors dry almost instantly and there is, therefore, little danger of the colors running. After the toy parts were colored, the toy was assembled and given a coat of pure white shellac to give it a lustre and brilliancy and to bind the colors together.

The boys found the work very interesting and only regretted the fact that their month of toymaking was soon to end. The close of each period found several new toys completed. The boys couldn't believe the fact that the toys, doing their respective stunts before their own gleaming eyes, were of their own handiwork. Such models as "Goo-Goo Tim", "Ring-Nose James", "Rocking Ralph", and "Jumping John", soon found namesakes among the boys. The popularity of the toymaking classes was not limited to the camp alone, as many visitors from the neighboring hotels came very often to observe the young toymakers at work.

Many fathers and mothers, when visiting their sons at camp, came to the playhouse quite frequently to watch their youngsters busily engaged in the modeling of their toys.

The keynote of the work done during the summer of 1918 was 'Patriotism." The boys all knew that they were then putting forth their efforts with the goal in view of raising a Red Cross Fund. At an exhibition and sale of the toys made that year, a fund of $100 was netted. This money was divided between local and New York Red Cross Units.

During the past summer, however, a greater number of toys were made owing to the new facilities at hand. Several exhibitions and sales were held on such occasions as camp entertainments and field days, when many hotel people and parents were present. Many of the boys desired to buy their own toys and requested their parents to do so. At the close of the camp season, the boys realized a fund of $175, which was donated to the New York Philanthropic League for Crippled Children.

The keynote of the second season's activity in the toymaking classes was, therefore, "Charity", and the youngsters were mighty happy that this splendid gift was realized by their own efforts. The proposed plan for next season is to allow the boys who will make the toys to keep one toy each for themselves and present the remainder of the toys (comprising the greater number) to the children of some institution, such as an orphan asylum or the Crippled Children's League suggested above.

The author has found toymaking to be an excellent manual training activity not only for boys' summer camps but also for private institutions and for the sixth and seventh grades of the city public schools. More toymaking should be introduced into the schools and in every case the toy models selected should meet the particular needs of the boys taking this work. Other factors that should determine the choice of models are the ages of the boys and the time of the year in which the work is to be done. There is no reason why toys cannot be so designed as to include all the elementary principles of construction in woodwork and the use of the various tools of the workshop.

PRACTICAL COURSE IN INDUSTRIAL ARTS

Solon R. Barber, Logan, Utah

The instructor of farm mechanics at the South Cache High School, Hyrum, Utah, Mr. E. P. Van Leuven, has found a way to keep interest in his work at a high pitch and at the same time teach the boys under his care something useful and practical. He says, "Give them a course in harness repairing." He has been giving such a course during the past winter and spring with successful results and he is of the opinion that such a course can be given at any rural high school with benefit.

The course in harness repairing and manufacturing at the South Cache High School is a regular part of the course in farm mechanics, under the Smith-Hughes act, now at the school. Mr. Van Leuven, however, used his initiative and originality when he decided to institute this branch of work because such activities as repairing broken harness are a part of but a very few curricula in the high schools of the United States. Mr. Van Leuven stated, "Our boys come from the farm. Our high school is a typical rural one. The boys are all familiar with harness and they evidenced a strong desire for harness repair. Why not?" And so he went to the nearest harness shop, bought material, and set to work to teach his students all about how to mend a badly injured harness. Now the boys are not only mending but they are also making harness according to their own taste and the needs of their farmer fathers. So popular has this course become that the boys do not want to leave it for something new. As a result of a little advertisement in the local papers the farmers in the neighborhood of the school are bringing in their harness to be repaired at cost. The project, however, is by no means a commercial one. Outside work is taken in only for one reason: to provide the students taking the course with plenty of work.

Just to show the scope and popularity of this work allow me to cite the following examples: There are fifty boys taking the course. A straw vote of the students was taken in order to determine whether or not they wished to continue with the harness repair work or go

Harness Repairing in the South Cache High School.

on with something new. Out of the fifty there were just three who wanted to change. All the rest were willing and eager to take more work in harness repair. The boys were urged to bring crippled harness from home to repair in the high school shops. They did so, and during the course five hundred repairs were made and in addition many things such as halters, bridles, lines, etc., were manufactured. The farmers became eager to have the boys do their repairing and one harness shop in the district refused to sell the high school more material because it claimed that the course was hurting its business. One of the local harness shops turned over rush work to the boys to do. The fathers were delighted at the interest and ability shown by their boys in this work. An exhibit of the boys' work was shown in the county seat, a city of about twelve thousand people, and it attracted unlimited attention and considerable favorable comment.

Now as to the details of the course itself.

The first four weeks of the course is divided into two periods of two weeks each. The first two weeks are used to teach the boys how to clean, oil, and mend old harness. The boys brought old harness from home to experiment upon and to mend. After a very few days these harnesses were taken home in a high state of efficiency, all oiled and ready for use. Following this period, after the boys had become familiar with their tools, two more weeks were spent in light harness making. Many bridles, halters, etc., were made during this period. In the exhibit of the boys' work many bridles were shown. These varied from simple riding bridles to highly ornamented ones for the work harness. The first work was on an old buggy harness, very dirty and in bad repair. Upon this victim the boys were instructed in washing and cleaning, oiling, and preparing it for repair. Waxed thread was made and a demonstration was made in hand sewing. Then instruction was given in adding buckles and straps. This preliminary work completed, instructions were given the students to bring old harness from home and repairs were made on them. Such repairs as head stalls, side stalls, gag runners, face pieces, nose bands, check reins, were made on the work-harness bridles. Tugs were spliced, lengthened, sewed the entire length, and other parts of the harness were repaired. Some of the more ambitious of the students made highly ornamented parts and some even went so far as to do some of the more difficult round work such as check lines, croupers, etc. In addition to the regular repair each boy made at least one halter or bridle while some of them went farther and made new lines for harnesses at home.

The total cost of material consumed in the course was one hundred dollars which is very low when the fact that so much work was done and considering the number of students who were engaged. The expense was kept down due to the fact that the class was divided into two sections so that one set of tools was sufficient for two boys. In spite of the low expense account a comparatively complete stock was kept on hand at all times in the store room. This supply comprised needles, oil, thread, wax, blacking, leather, buckles, gag runners, hame knobs, in fact everything for which need was found in the course. Considering the results achieved, however, the equipment was somewhat meagre.

INDUSTRIAL-ARTS MAGAZINE

E. J. LAKE S. J. VAUGHN
Editors

EDITORIAL

BUSINESS IS BUSINESS.

THE secretary of a state bureau for the appointment of teachers makes the interesting observation that in numerous cases under his attention, teachers have been employed for next year at salaries higher than the ranking teachers under whose direction they will work. This implies a condition than can hardly result in a tolerable situation for next year in many schools.

We presume that with keen business instinct the school official has gone to market determined to complete his staff at any price and before his competitor receives the coveted recruit from college. Even so! If he has neglected to allow for the adjustment of standards in the school organization and is to depend on the parable of the talents to bring harmony out of discord, we will be interested to note the results.

A SUBSTITUTE.

IT may be noticed that less effort has been made during the past few years than previously to get up shows of school-work. During the past year many of the schools have found such difficulty in carrying on class work with a reduced staff of teachers and increased numbers of pupils that no time or energy has been left for the annual display.

Such a condition is deplorable, for the emphasis on school affairs to the community was never more needed than at present, when it is evident that the schools need greatly increased support. By way of a substitute for the elaborate "open house" reception and exhibition of previous years, we recall the most effective school demontration of our experience. It was in an institution for the blind, and with no preparation for visitors or attention to them, the classes continued with their work as unconcerned as tho no one was present.

One other very recent incident bears on the idea in mind. The Rotarians of a considerable city visited the schools in a body and prominent citizens observed classes at work, the equipment for work and the lack of it, *for the first time in their busy, important lives.*

Herein lies the best substitute for the elaborate annual show of the schools. Arouse a sense of responsibility in local organizations to the point of making it a part of their official duties to look in on the educational operations of their children.

SPEED AND EFFICIENCY.

PERHAPS the most important conclusion coming from the mental tests that have been given to large numbers of school pupils in certain localities is the denial of a common conception that the quick mind is not the effective mind.

The most successful of these tests puts a premium on quick and accurate response. A few children in some schools have been found to be of mental ability that allowed them to carry on the work of advanced grades with success, and have been promoted accordingly regardless of age. In other localities these brightest pupils have been given more difficult work in the same grade in place of advancement to a higher school grade. Either plan has its administrative difficulties, but the important conclusion that the *quick mind is the effective mind,* should lead to a deliberate change in methods of instruction in some subjects.

That mental efficiency can be accelerated is evident in the results of silent reading, which is found to develop the speed of reading in a remarkable manner. The application of methods to develop quick response in the manual arts may not be so successful because of the combined physical and mental response in such work, yet there can be little question that the time element should be given more attention in manual arts instruction.

That project which allows slow, deliberate execution without the obligation of mental alertness may be found to lack the characteristics of educational effort. We have observed such work in school courses. We have also observed the inclination on the part of manual arts teachers to allow the pupils to fuss over a tedious execution that seemed to have no other function than to keep the class going.

Mental alertness can only be developed by a project that keeps the mind as well as the body engaged. If speed and efficiency have as much in common as the mental tests would indicate we may well speed up with assurance in our manual arts instruction.

SERVICE OR SALARY—OR BOTH?

SOME fairly satisfactory work is being done in various parts of the country in the matter of vocational advisement and placement. But in most schemes that have come to our notice, very little if any emphasis is placed upon the question as to whether or not a given position or trade offers opportunities for service. It would seem that the great emphasis everywhere is now being placed upon the one consideration of money—whether or not a position will *pay.*

We certainly are not among those who would disregard the element of possible income, but we certainly should not make it the sole and supreme test of the desirability of any line of work. As a matter of fact, if we may generalize upon the records of the probate courts, at least 90 per cent of the work, the positions, and the jobs in this country *do not pay.* Such records seem to show that at least 90 per cent of the people who die leave practically no estates or property of any sort. Perhaps they are all failures who die. They certainly are failures financially, if these records are to be believed.

Perhaps again their successes do not always show in their death certificates, in the probate records, or in their bank accounts. Maybe there are successes outside of Dun's and Bradstreet's ratings.

Let the young men and young women be guided if possible to desirable employment and lucrative positions; but by all means let them be inspired with a vision and an ambition that will not be satisfied with anything short of the largest and most wholesome service that lies within their capacity to render.

SHALL THE PART TIME LAW BE IGNORED.

THERE are cities in this country, we are told, that are practically ignoring the law providing for the establishment of part-time schools and classes and for the compulsory attendance of working boys and girls under certain ages. If true, this is a most serious situation. For if school authorities are so short-sighted and positively mendacious as to let such a duty and opportunity to do something for these boys and girls go by default, they are guilty of a gross neglect that may conceivably be given a rather serious legal status.

We have heard a few school officials rather complain that this new legislation forces a critically congested situation upon the schools! Think of a man of vision *complaining* that the door of the public school has been opened again to those who, for one cause or another, have dropped by the way without any sort of adequate preparation either for life or a livelihood!

The wise school officials will take advantage of this new legislation to go before their communities and ask for sufficient funds with which to work and to build and to make the public schools what they should be. They will tell their communities of the congested conditions due to the new and wonderful opportunity schools. Any school principal or superintendent who is a real leader and who is intelligent concerning the part-time school work can go before his community and make such a strong case that he can have support and bonds and buildings and equipment and whatever seems desirable to meet the new demand and the new opportunity.

But it will take men and women of vision and faith in the public school as it reaches out into this new field. So, let us hope for people of vision who are wise enough and strong enough and courageous enough to take up the new task which the part-time school presents.

CRITICISM OF THE FEDERAL BOARD.

The Federal Board for Vocational Education has been subjected to the severest sort of criticism on the charge of inefficiency, delay, and of an improper and unsympathetic attitude in the matter of the rehabilitation of the disabled soldiers.

That there was inefficiency as well as delay, especially in the early months of the work, there seems no room for dispute. That there was (and still is) an improper and unsympathetic attitude in some regional offices toward the wounded soldiers seeking government aid, seems to be pretty well established. The "hard-boiled" order was issued, if at all, by a very indiscreet and a very foolish person.

However, we are disposed to feel that the condemnation has been too sweeping and too general, in view of the conscientious efforts of competent staffs in some of the regional divisions. Furthermore, we appreciate the almost insurmountable difficulties which faced such staffs. We understand somewhat the tardiness of other governmental agencies upon which the Federal Board was dependent and which deserve a large share of the blame. We are aware also of the peculiar shortcomings and the restrictions of the legislative act under which this work must be conducted.

Progress is now happily being made. The decentralization of power and a more generous distribution of authority have been accomplished. In the Middle West, concerning which we speak with some knowledge, efficient and sympathetic men have been put in charge. The work here seems to us to be conducted as expeditiously and as satisfactorily as the cumbersome and highly centralized national system of uncoordinated bureaus would permit. The red tape seems to be cut. The regional offices with which we are familiar are busily and conscientiously working at the task of getting full justice, so far as the law and the circumstances make it possible, for every man who is entitled to training at the hands of the Federal Board.

We believe in teaching art for use. This is our creed. The pupils must feel that every time they hang a picture, change the furniture in a room, choose a coat or buy a hat or a tie, an artistic decision is made. They must feel that Art is a real and vital thing.—*James Parton Haney.*

The personal force of the teacher is the main thing. Outfit and apparatus, about which so much fuss is made, are secondary.—*Samuel Chapman Armstrong.*

John Cotton Dana in writing of some printing done in a shop where he worked as a young man has said: "As we had no rules, borders or ornaments, and as simplicity was the quality chiefly sought, we found it rather difficult to do printing that was ugly or unseemly."

The lessons taught by the war must not be lost with the coming of peace. American industry has justly prided itself on its scrap pile. The American army has abolished the human scrap pile. The American high school has heretofore scrapped its children when it should have scrapped its aims, its method of organization.—*Dr. J. L. Tildsley.*

The state of Missouri **has $250,000 available in state and federal money for the promotion of vocational education during 1920-21. Of this amount, $96,000 will be spent for the teaching of agriculture, $38,000 for the trades and industries, $16,400 for home economics, $27,300 for part-time classes, $28,600 for agricultural teacher-training, $21,500 for part-time teacher-training and $21,500 for the training of home economics teachers. Vocational instruction in part-time schools and in evening schools will be paid out of the trade and home economics funds.**

LITTLE ARGUMENTS ON GREAT PRINCIPLES

"On Normal and Abnormal"

"Ho hum!" exclaimed Mr. Frills. "These Spring days make me long for sunny France. How I would enjoy a 'petite dejeuner' at the little hotel in Barbizon, a jaunt thru the forest of Fontainbleau with my kit on my back, and a good, long summer of that delicious, artistic atmosphere that only France can supply!"

"Sunny France! Artistic atmosphere!" grunted Try Square. "The very thought of France makes me want to put on my goloshes and mackintosh. As to *artistic atmosphere,* I never use that kind. American industrial atmosphere is good enough for me."

"Every one to his taste," replied Frills, with a shrug. "But you must agree that this industrial atmosphere of America is a little trying to the nerves as well as the lungs, Mr. Try Square!"

"No, I do not agree that France has a single advantage over America in industry or atmosphere, and as for 'industrial atmosphere', I am so constituted that I get fat on it. The busier and dirtier, the better for me; I take real delight in hearing the smoke puff, the steam hiss, and watching the wheels go round. Besides, we need that kind of thing at present more than ever before. Nothing less than a great increase in production will bring living conditions back to normal."

"I suppose you are right in that, Mr. Try Square," said Frills sadly; "but what do you mean by *normal?* Surely you do not expect prices to go down to what they were before the war while wages stay up to the present scale!"

"Well! *Normal* means *ordinary,* I suppose," replied Try Square. "We want all conditions *ordinary* in order to accommodate the *ordinary* people. Ordinary folks are in the majority, you know; and the majority must be accommodated."

"But my dear Mr. Try Square, your program does not allow for any change in standards, and you must confess that civilization has never remained at one level for a considerable time. It must either go up or down according to the strongest influences. With the human animal there is no normal standard of living or accomplishment. He is a restless, ambitious creature who thrives because he strives. Humanity can no more thrive at one plane of living and in one common state of mind, than a pool can remain sweet and pure without disturbance."

"Perhaps you are right," said Try Square thoughtfully. "And I guess it is just as well that we are not all alike, or we would all be after the same job. You go to France and get your fill of artistic atmosphere and bring back some of that emotional uplift that keeps civilization out of the rut, and I will spend the summer in the busy American city. I like it!"

THE PILGRIM MEET OF THE EASTERN ARTS ASSOCIATION, BOSTON, MASS., APRIL 1, 2, 3, 1920

TEN years ago this month the Eastern Arts Association held its first meeting as an association in Boston. It was fitting that the tenth anniversary of the birth of the society (which was formed then by combining the Eastern Normal Training Association and the Eastern Art Teachers Association) should be in Boston. Unfortunately housing conditions are such that the convention area had to be scattered. Rooming accommodations were found at the hotels around Copley Square, but most of the meetings were grouped in the vicinity of the Art Museum on Huntington Avenue, with the main meetings at Wentworth Institute. The arrangement was on the whole, however, very satisfactory and convenient.

For the first time for several years an exhibition was attempted. For this purpose Wentworth Institute gave over its large exhibition hall besides several other rooms on the first, second, third, and fourth floors. The exhibition was in charge of Mr. Francis L. Bain, Department of Manual Arts, Boston, as chairman of school exhibits, and Mr. D. Fletcher Barber, of Chandler & Barber Company, Boston, as chairman of the trade exhibits. The main hall was arranged with the trade exhibits down the center, and school exhibits around the sides.

The aim of the exhibition was to show purposeful work which was of perhaps a new significance, and to avoid showing courses, with which all of us as teachers are more or less familiar, or a mass of similar material. The result was a carefully selected small amount of work from each community participating. Besides Boston, the Massachusetts State Board of Education, State-aided schools; North Adams and Framingham normal schools; Brookline, Everett, Malden, Lynn, Somerville, Yonkers, N. Y., and Hartford, Conn., were represented as well as the Skidmore School of Arts, Saratoga Springs; Salem, Massachusetts Applied Art School, Rhode Island School of Design, North Bennet Street Industrial School, which showed excellent exhibits.

The shopwork shown, besides woodworking, covered cardboard, bookbinding, clay modeling, printing, tinsmithing, wood block and linoleum engraving, cement work, and tin can toy work in the grammar and intermediate schools; and appropriate variations of these for high school work. One of the most interesting features of the exhibition was the working exhibits, showing the teachers and boys at work in wood and linoleum type making, cane weaving, school gardening, woodworking and electricity as represented by a large-scale house model, cooking and sewing, bookbinding (elementary and prevocational), tin can toy making, varied crafts by the

Horace Mann School for the Deaf, home mechanics, modeling in cement, sign painting (prevocational), design (Normal School), and Industrial arts (High School of Practical Arts). Rug weaving was also shown in the exhibit room assigned to the Department of Household Science and Arts.

One of the special features which attracted considerable attention was the exhibit of the prevocational classes in bookbinding, printing, machine shop practice, sheet metal, electricity, woodworking, and painting and lettering. The exhibit was arranged to show the close tie-up between the shop and classroom, and to make clear how the shopwork carries over to the classroom, motivating the work in arithmetic, history, geography, English, spelling, reading, writing, etc.

The art and drawing exhibits were excellent. Boston showed its new arrangement of courses, beginning with (a) the impressions of Vision in tones, positions, directions, measures, proportions, and shapes; (b) Order as observed in nature and in works of art in the following forms: continuations, recurrences, or repetitions; progressions or sequences; balances.

There was not an exhibition of high school drawing which did not receive deservedly its proportion of praise. One of the biggest and most comprehensive exhibits was made by the Brookline High School.

A unique feature was the Members' Exhibit. There were 87 contributions to this exhibit, covering 26 paintings, a study for a bookend in clay, three studies in bookbinding, three in painting bead chains, two in cardboard work, two in lace work, and three in printed textiles. Contributions were received from many members in Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and Ohio.

The program was a very full one, and the speakers well chosen,—men and women who had something to say and knew how to say it. The program for Thursday morning was as follows: Address of Welcome by Dr. Payson Smith, Commissioner of Education for Massachusetts; "Vocational Education, Its Relative Place in a Program of Public Education", by Robert O. Small, Director of Division of Vocational Education, Massachusetts; and "The Young Worker and the Continuation School", by Owen D. Evans, Director of Continuation Schools, Boston.

Thursday noon, there was a luncheon at the Museum of Fine Arts, for the Pennsylvania Museum and the Industrial Arts School, with Mr. Charles T. Scott as chairman, and for the Pratt Institute Alumni Association at Hotel Hemenway, with Mr. Ernest W. Watson as chairman.

Thursday afternoon there was a joint session of art and normal schools at the Boston Museum of Fine Arts, Miss Mabel B. Soper, State Normal School, Bridgewater, as chairman. The speakers were Professor Walter Sargent, University of Chicago, who talked on "Present Trend of Art Education"; and Mr. Albert L. Barbour, Superintendent of Schools, Quincy, who discussed "Responsibility of the Normal School in Training Teachers of Drawing in Relation to General Education." The discussion was led by Miss Mabel Chase, of Newark, New Jersey.

The Manual Arts Section, Mr. Ralph W. Babb, chairman, met at Wentworth Institute. The speakers were: Mr. Arthur L. Williston, Principal of Wentworth Institute, who gave the Address of Welcome in behalf of the Institute; Miss Loretta J. Curran, Supervisor of Correlation, Prevocational Schools, Boston, who spoke on "What the Manual Training and Practical Arts Teachers Can Do for General Education Today"; Mr. Charles W. Parmenter, Head Master, Mechanic Arts High School, Boston, who discussed "The Outlook for Manual Arts in High Schools." The discussion was led by Mr. Harry L. Jones of Somerville.

The Vocational Guidance meeting was held at the Boston Trade School, Mr. Michael W. Murray, chairman. The speaker was Mr. Dwight L. Hoopingarner, Lecturer on Employment Management, Harvard Graduate School of Business Administration.

The Household Arts and Science Section met at Perkins Hall, Women's Educational and Industrial Union, Miss Louise I. Pryor, chairman. The speakers were Miss Eleanor Manning, Architect, Lecturer in Housebuilding, Simmons College, who talked on "The Small House"; Miss Millicent Coss, Household Arts Department, State Normal School, Framingham, who discussed Textile Charts; Mr. Frederick T. Whitney, Practical Arts Department, State Normal School, Salem, who talked on "Color as Applied to Dress." Textile charts were shown.

The School Garden Section met in Boston Normal School, D. W. O'Brien, chairman. The speakers were Dr. W. H. D. Meier, Director of Department of Biology and School Gardening, State Normal School, Framingham, who discussed "The Art and Science of Gardening"; and Miss Breta W. Childs, Department of Science, Worcester Normal School, who talked on "Training Teachers for School Supervised Home Gardening." Miss Mary C. Mellyn, Assistant Superintendent of Schools, Boston, and Mr. Leonard M. Patton, Master of the Edward Everett School, Boston, participated in the discussion which followed.

A new section introduced this year was the Teacher Training Section. Massachusetts is taking the lead in this work for the training of mechanics as vocational teachers. The meeting was in charge of Mr. M. Norcross Stratton, Agent for Industrial Teacher-Training, Massachusetts Department of Education, Boston. The speakers were Mr. George A. Burridge, Director Springfield Vocational School, who spoke on "Training Vocational Teachers in Massachusetts"; Mr. Harry Leroy Jones, Director Vocational and Manual Arts Work, Somerville, who discussed "Training Teachers in Service", and Mr. Oakley Furney, Specialist in Part Time Education, New York Department of Education, who talked on "Vocational Teacher-Training in New York State." Mr. William D. Parkinson, Agent in Charge of Teacher-Training, Massachusetts Department of Education, led the discussion.

Thursday evening, the New Jersey members had a dinner at the Boston Museum of Fine Arts, with Mr. William R. Ward as chairman.

In the evening, the general meeting was at the Museum of Fine Arts, President Frank E. Mathewson presiding. The speakers were Fitzhugh Carrington, Curator of Prints and Engravings, Boston Museum of Fine Arts, who talked on "Early Florentine Engravings"; Miss Violet Oakley, Mural Painter, discussed "Architectonic Painting"; and Mr. Huger Elliott, Supervisor of Educational Work, Boston Museum of Fine Arts, who spoke on "Gardens of Peace: A Topiary Pilgrimage."

Friday morning was given over to visits to the exhibitions, sight-seeing trips, etc. Unfortunately, the weather was inclement, which interfered with the plans of many people. Friday noon, the largest luncheon of the convention was held at the Hotel Hemenway, the Inter-Club Luncheon, John J. Hatch, President School Crafts Club, New York, chairman. After an excellent luncheon, Mr. Hatch called on the presidents of the affiliated clubs of New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania.

Friday afternoon, the Manual Arts section met at Wentworth Institute, Michael W. Murray, chairman. Some of the speakers not being able to attend, the meeting was opened to members from the floor, which led to discussions of considerable interest. This was followed by a paper on "Teaching Printing Efficiently", by Mr. Leslie S. Burnell, printing instructor at the High School, Lynn; and one on "The Proper Training of Manual Arts Teachers", by Mr. Josef Sandberg, Principal, Sloyd Training School, Boston. The discussion was led by Mr. William C. Crawford, Master of the Boston Trade School.

The Art Section met at the store of Jordan Marsh Company who were at that time giving a very interest-

ing art exhibit. They listened to addresses by the heads of departments of that concern on "The Problems of an Interior Decorator in a Department Store", "How to Reach the Public Thru Artistic Display of Merchandise", "Style", and "The Get-to-gether Viewpoint for Betterment of American Homes", by A. E. Lyons, President National Association of Decorative Art, Commissioner Allied Wall Paper Industry.

The Household Arts Section met at Simmons College, Dr. Alice F. Blood, Director of the School of Household Economics, Simmons College, Boston, chairman. The speakers were Miss Lucy H. Gillett, Director of the Dietetic Bureau, League for Preventive Work and Lecturer on Dietetics in Social Service, Simmons College, Boston, on "How Can Our Work in Foods Be Made Vital for the Health of the Child?"; Miss Daisy B. Treen, Director of School Lunch Department, Women's Educational and Industrial Union, on "What Can the School Lunch Accomplish?"; Mr. Frederick Howe, Head of Chemistry Department Framingham Normal School, and Miss Anna A. Kloss, Agent for Teacher-Training in Household Arts Schools, on "How Can We Create a Sense of Responsibility in the Prospective Teacher?"; Mrs. Alizra W. Sandwall, Health Instructor in Foods, Division of Hygiene, Massachusetts Department of Health, who talked on "Report on Nutrition Classes and Clinics in Massachusetts." The discussions were led by Miss Laura E. Comstock, Home Demonstration Agent, Massachusetts Agricultural College, who spoke on "The Need as Seen by the Home Demonstration Agent", and Miss Winifred Rand, Acting Director, Baby Hygiene Association, Boston, who discussed the subject, "What Can Be Done for Children of the Pre-school Age?"

The School Gardens Section met at Wentworth Institute, D. W. O'Brien, chairman. The speakers were Dr. Rufus W. Stimson, Agricultural Agent, State Department of Education, who talked on "Uniting Home and School Thru Productive Projects"; Mr. O. H. Benson, Director Junior Bureau of the Eastern States Agricultural and Industrial League, who spoke on "Relation of Home Industry, Commerce and Trade to the School."

The Vocational Guidance section, under the chairmanship of Dr. John M. Brewer, Director of Bureau of Vocational Guidance, Harvard University, met in Wentworth Institute. The speakers were Mr. Owen D. Evans, Principal, Boston Continuation School, who discussed "Vocational Guidance in the Continuation School: Helping the Boy and Girl to Find Themselves"; Miss Annie F. Slattery, Malden High School, who spoke on "The Class in Occupations as a Necessary Correlative of Work in the Arts."

The evening session was held at Wentworth Institute, President Frank E. Mathewson presiding. Mr. Clarence D. Kingsley, Chairman of the Commission on the Reorganization of Secondary Education, State of Massachusetts, spoke on "The Place of Practical Education in the Modern High School." He was followed by an excellent and stirring address by Mr. Clipston Sturgis, Architect, Boston, on "Art Education."

Mr. Sturgis, in his address, left this thought strongly impressed upon the audience: "Beauty is an everlasting thing, and it is our absolutely inalienable heritage. It means that we are always striving for ideals, which means failure all the time because when you reach your ideals they are no longer ideals. The beauty of it is that when you have almost reached them, they move on a little bit further. The thing that keeps us alive and young, and makes life worth while living is striving for ideals, never being discouraged because you fail, even tho you fail again and again, and continuing with your faith absolutely unshaken. The requisites for our life, as I see them, and that means the things that we must plan out to do in school, are faith, courage, and endurance.

"'That low man thinks a little thing to do, sees it, and does it. This high man thought a great thing to do, dies ere he knows it.' This is the history of the great people of the world."

The meeting was fittingly brought to a close on Saturday morning by three most excellent addresses by Professor Charles R. Richards, Director Cooper Union, New York City, on "The Industrial Art Survey, Its Purpose and Scope"; Mr. Frank V. Thompson, Superintendent of Schools, Boston, "The Democratization of Instructors and Instruction"; and Mrs. Anna Coleman Ladd, on "Art and Life."

Mrs. Ladd was a leader in modeling faces for men who were disfigured in battle.

The officers for next year are:

President, Ernest W. Watson, Pratt Institute, Brooklyn.

Vice-President, Edward C. Emerson, Department of Manual Arts, Boston.

Secretary, M. W. Haynes, Vocational School, Bayonne, N. J.

Treasurer, A. H. Wentworth, Board of Education, New Haven, Conn.

Chairman, Editorial Board, Florence O. Bean, Department of Manual Arts, Boston.

Chairman, Publicity Committee, Dr. E. B. Kent, Board of Education, Jersey City, N. J.

A MACHINE SHOP PROJECT.

Harold Howes, University of Washington, Seattle, Wash.

An interesting question frequently comes up in the machine shop as to how close can a machinist measure with a caliper and scale alone? In the high school machine shop classes one will find boys that consistently get results that only average .002 of an inch error.

Try this one on your class: Issue a scale, a pair of outside calipers and a $\frac{3}{4}$" mandrel or a screw blank that has been turned and filed approximately to size. Do not be particular in this case as to the diameter as the test pans out better if the objects vary several thousandths. Instruct the class in the touch required and the reading of the scale to split sixty-fourths. Convert this result to thousandths of an inch arithmetically or by reference to a table. Tabulate the results and check them yourself with a micrometer. About this time you will be pleasantly surprised.

We have tested in this way several classes of sixteen members. The average error being .0043, .0033, .0042, 1006, etc. The last one being the error of the Smith-Hughes class in spite of more training in measurements in the related science classroom. It cannot be denied that several boys followed the leader in reading the dimensions on their scales and gave results that were not their own. However, these results were farther from the truth than the ones they obtained alone after class. Another thing noticeable was the inability of carrying this accuracy over into other work. We know now, however, that the poor work turned in is not on account of inability to read the scale.

The writer recalls an article in the American Machinist a few years ago in which it was stated that any machinist could easily measure to one-hundredth of an inch, but it is surprising how few mechanics really try to calibrate themselves as it were. Can you split a hair with the eye? If you are skeptical, try it out on the class.

Oklahoma City, Okla. The manual training department has made a specialty of gasoline engines during the last term. One of these engines was exhibited at the state fair.

The students of the department have also undertaken a practical study of automobile and motorcycle mechanics. All broken machinery of the department is repaired by the students.

Butte, Mont. An industrial class for trade workers has been established at the Butte high school, with Mr. C. H. Forbes and Mr. Louis Kilberer as teachers. The class meets three evenings a week and instruction is given in mechanical drawing, machine shop practice, wood and metal work.

TRADE SCHOOL STUDENTS IN KANSAS CITY BUILD SCHOOL BUILDINGS

Myron G. Burton, Director of Vocational Education, Kansas City, Mo.

THE problem of providing productive work for trade school students is one which constantly confronts the management of Smith-Hughes schools. This productive work should be carried on under conditions as nearly as possible approximating the actual conditions in the trades. It also happens that a large per cent of the students who are interested in trade education find it necessary to earn a portion of their living expenses while going to school. The plan in the Kansas City school system is to utilize the building and repair work of the entire city system so far as is feasible for educational purposes in the trade schools, and to pay the students a fair price for such work. In this way, a double purpose is accomplished—that of furnishing productive work under the same sort of conditions which the trade students will be expected to meet in after-life, and also to enable them to have a source of income while learning their trades.

Students Painting a Unit of the Fairmount School Annex.

How this plan has been used in a great many projects in the past two years can be fully understood by the following report of the building of the Fairmount School Annex last summer and fall. Other buildings were constructed during the summer and additional ones will be built this coming summer. The account herein given is therefore typical of the policies of the Kansas City system.

The plans for the Fairmount School Annex were drawn by the regular school architect. These plans and specifications were turned over to the Lathrop Trade School where each department was given an opportunity to make a careful study of the work which that department was expected to do in connection with the production of the building. The blue prints were carefully studied in the drafting department; supplemental and detail sheets were drawn by the students in order to acquaint themselves thoroly with the details of construction.

The work was started about the middle of June by a masonry class of twelve students working under their regular instructor. They did all the excavating and laid up the rock wall. As soon as their work was completed, the carpenters took charge. All window and door frames, cornices and other shopwork had been made in the carpentry shops of the Lathrop Trade School, so that by the time the frame was completed, these door and window frames were ready to be set. The sheet metal classes constructed all guttering and downspouts and kept in close touch with the work so as to install their portion at the most convenient time. The building was completely wired by the class in electricity in accordance with the Kansas City code. Each of the four rooms was equipped with droplights and fixtures with wall switches. The lavatories, drinking fountains and all other plumbing were designed and installed by the trade school class in plumbing. The paint class painted the building completely and decorated and tinted the interior. The major portion of the work was completed so that the building was ready for occupancy at the opening of school early in September, but some of the decorative work was carried along in the early fall so as to provide profitable work for the students thruout the fall and winter term of school.

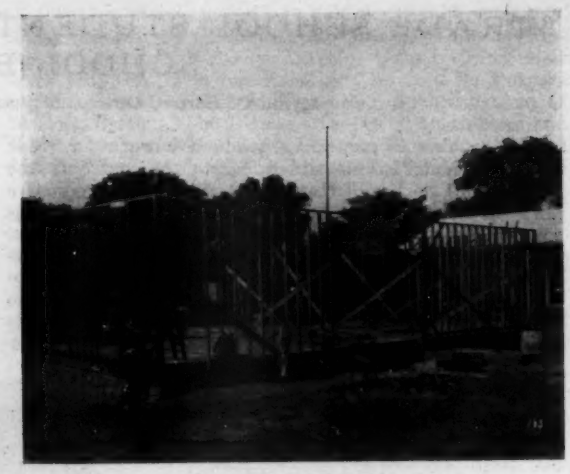
A number of other jobs for the school board were carried along simultaneously thruout the summer and fall, and students were shifted from one job to another to meet the needs of their work. Each class was under the general supervision of its regular trade teacher, but the boys worked in small groups with a student foreman in

Wiring the Buildings.

charge. The boys were paid for the work by the hour in proportion to their individual ability, the price varying from 15 to 35 cents per hour. Job tickets were made out, costs of material computed, time cards kept, and the whole work was handled in a manner very similar to regular contract work. Computations arising from this work were used in the related mathematics classes to give the students a comprehensive knowledge of trade mathematics. The writing of specifications for the work was used to motivate the work in English. In this way, the academic teachers were brought into close contact with the productive work of the students.

At the time the Fairmount Annex was being constructed, two other annexes built on the same plan and specifications, were going up in other parts of the city under a regular commercial contractor who received his work on lowest bid. When the final report was made on the Fairmount building, it was found that the plan of having the work done by the trade school students had produced a piece of work in every way equivalent to the regular contract work and at a saving of $389.81. Every student who was employed in this work had received a compensation equal to, or greater than, he could have earned elsewhere; and he had the advantage of working under very favorable conditions, being constantly under the guidance of his regular trade teacher, whose paramount interest was in the development of the student. Each teacher had the authority at all times to stop the progress of any piece of work and to call the class together and spend as much time as he deemed necessary for explanatory purposes. After the lunch hour the students were frequently gathered in groups for a discussion of plans and specifications. This not only added considerable interest to the work, but promoted the students' development.

Productive work under a foreman other than a teacher is always in danger of exploiting the students, but if the development of the student is made the principal consideration, it has been proven possible to utilize practical work. The work can be done in such a way as to produce buildings and satisfactory repair work at a price usually slightly less than the market prices; and at the same time it gives the students the best possible training and skill in their respective trades.



The Framing Going Up.

FIFTY-SIX YEARS AT THE FORGE.

J. Richard Lamberth, instructor in forging and metal work at the Massachusetts Institute of Technology, is the dean of forge workers, blacksmiths and metal workers of America. He was recently 72 years old, and has spent 56 years of his life at the forge and anvil. For 35 years he has been the head of the laboratory of forging at Technology, and in all that time he never missed a single regular class day. It is also said of him that he never missed a weld. To watch him at work instructing students as to the best way of shaping a red hot piece of iron or to make a weld is a revelation in quickness, dexterity and skill. He learned his trade at the Atlantic Works, in East Boston, and in 1863 worked at sorting and working scrap iron which went into making one of the famous Monitors that fought in the Civil War. For fifteen years he was at the Salem Car shops, and he also worked for the Eastern Railroad.

Mr. Lamberth at the Forge.

PROBLEMS AND PROJECTS

The Department of Problems and Projects aims to present each month a wide variety of class and shop projects in the Industrial Arts. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

Problems in benchwork, machine shop practice, turning, patternmaking, sewing, millinery, forging, cooking, jewelry, bookbinding, basketry, pottery, leather work, cement work, foundry work, and other lines of industrial-arts work are desired for consideration. The editors will not accept the old hackneyed problems of footstools, taborets, towel holders, etc., which have been made from time immemorial, ad nauseum.

Drawings and manuscripts should be addressed: The Editors, INDUSTRIAL-ARTS MAGAZINE, Milwaukee, Wis.

A PIANO BENCH.

R. A. Todd, Salem, Ohio.

This problem is one that does not require the use of any machines, therefore should be of interest to those not blessed with such. It is one that any boy of the eighth grade who has a good working knowledge of tools can construct and feel well paid for his efforts. A great amount of instruction is not necessary. I have not seen a better problem demonstrating the molding of wood than this one. Since the wood used was walnut we finished it by giving it successive coats of oil, shellac, filler and three coats of good rubbing varnish.

The design of the top, legs, sides, ends and stretcher were first sketched on heavy paper and then cut out. This will have to be done in part by the instructor unless the pupil has a very good sense of proportion. The design of these may be changed without enhancing the beauty of the piece. While the lower stretcher shown is very good I think the pupil should be encouraged to change it for one of his own design thus adding a little originality and increasing his interest.

Mortise-and-tenon joints were employed thruout. Several methods may be used in placing the bottom or part below the lid. The lower stretcher was made, in this case, of one piece of wood and should be a little longer than the drawing calls for. Since this is handmade there is bound to be a little difference in the legs and this can be easily taken care of if the hint above is taken. The stretcher may be fastened to the legs by dowel pins.

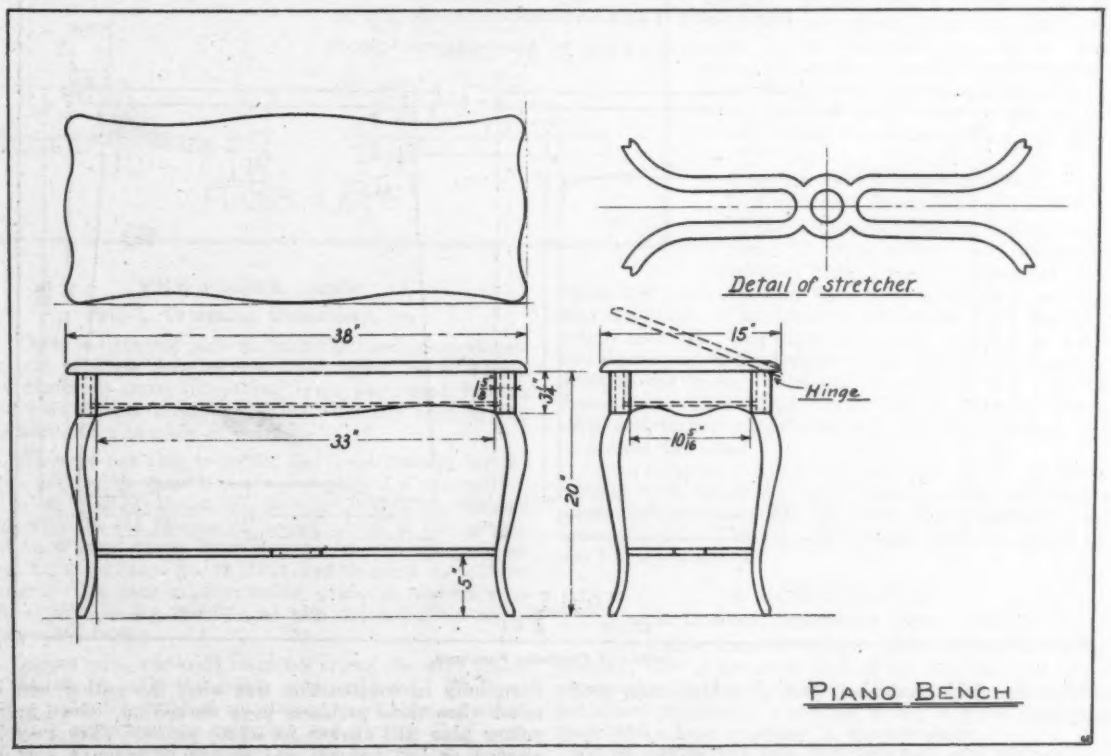
This problem boosted the interest of my boys almost a hundred per cent in manual training. After they had seen that it was not beyond their ability to make real pieces of furniture numerous requests were made for more substantial pieces such as heavy rocking chairs, phonograph cabinets, library tables and cedar chests.

Play Furniture Designed by Mr. Denman.

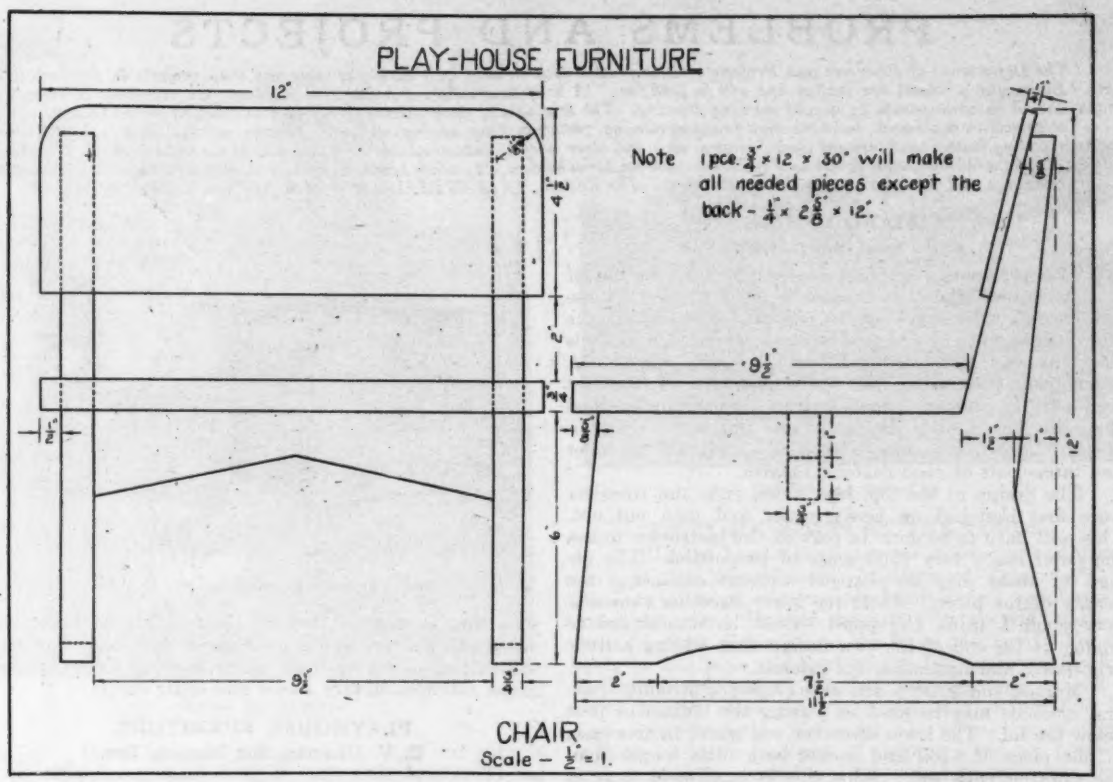
PLAYHOUSE FURNITURE.

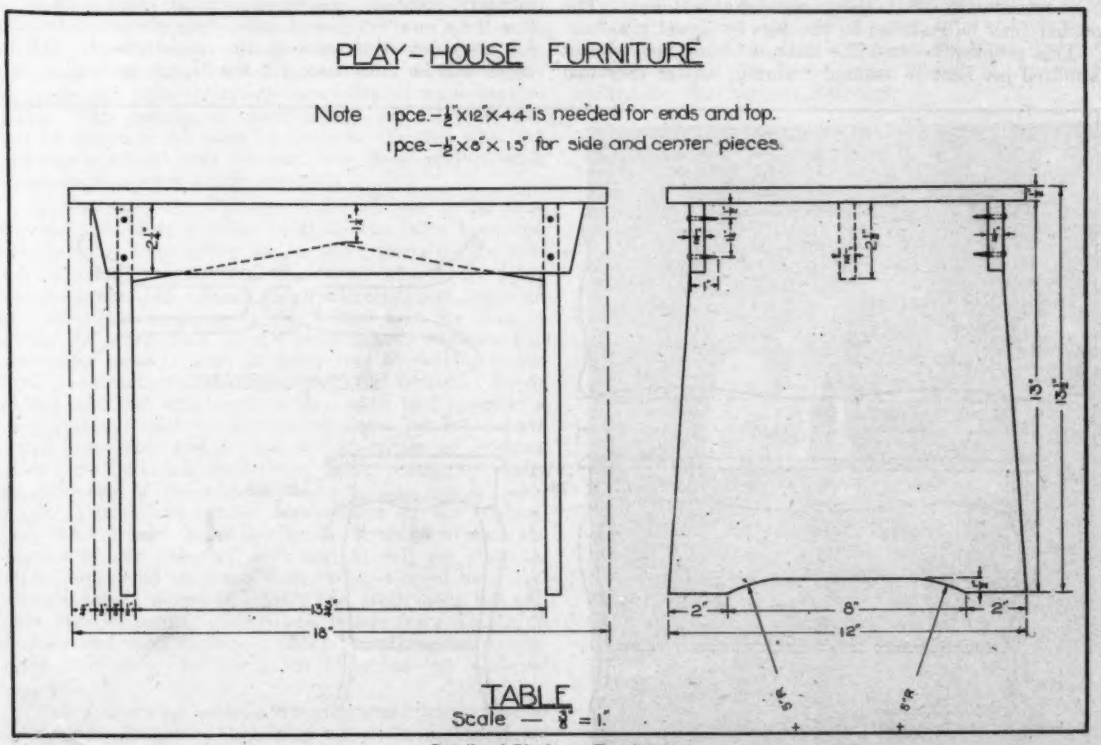
C. V. Denman, San Marcos, Tex.

The next time one of your beginners insists upon making a library table or a morris chair as his supplementary problem, instead of a point blank refusal, ask him if he wouldn't like to make some playhouse furniture for his sister or someone in the neighborhood. Tell him there will be time later for the things he had in mind



Details of Piano Bench.

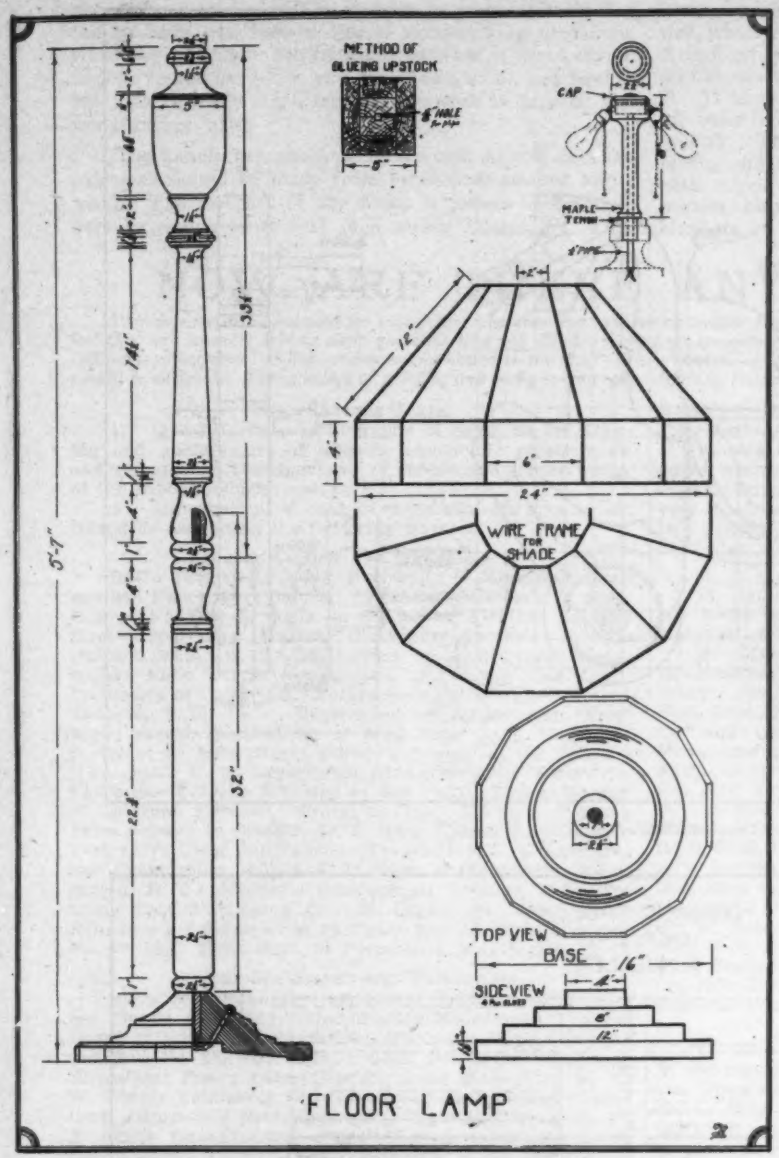


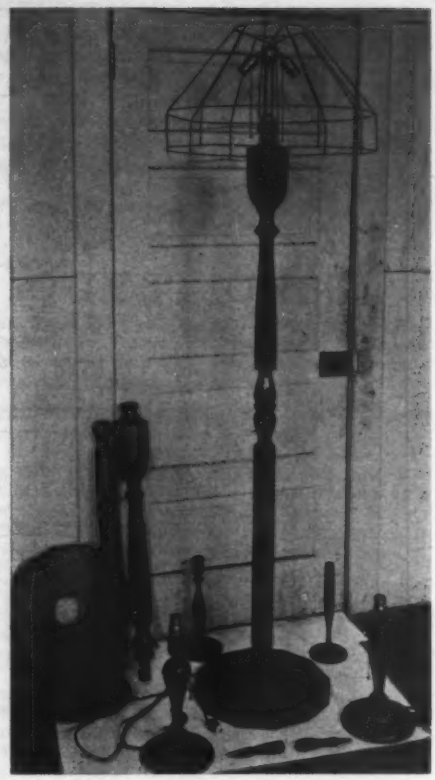

PLAY-HOUSE FURNITURE
Note 1 pce. - ½" x 12" x 44" is needed for ends and top.
1 pce. - ½" x 6" x 15" for side and center pieces.
13½"
18"
2"
8"
12"
TABLE
Scale — ⅜" = 1."

Details of Playhouse Furniture.

and that this table and chair will give him some good experience.

The drawings, together with the photograph of the table and chair, hardly call for any additional explanation. Simplicity in construction was what the author had in mind when these problems were worked up. Good grade yellow pine will answer for these pieces. They may be stained or left natural and should be given a coat of shellac or furniture varnish.





Floor Lamp and Other Turnings Made in the Uniontown High School.

THE FLOOR LAMP.

Paul L. Cressman, Uniontown, Pa.

Three dollars was paid for material used in constructing one of these floor lamps. The select black walnut cost about 40 cents, it having been purchased from a farmer at $40 per thousand. This wood had been drying in a barn for a number of years.

We were not able to secure the brass fixtures for the upper part so we turned maple and gave it a natural finish to serve as a substitute. For our design we resorted in part to the old Roman oil vessel, which is still prominent in a great many lamp designs, and in the base we tried to avoid any design that would serve as a dust catcher. The size of our lathes made it necessary to have a joint in the middle and also did not allow us to swing a 16″ base.

Copper wire was used in constructing the wire frame for the shade. All the joints were soldered. This offered a splendid problem in gluing up stock accurately, designing, wood turning, soldering and wiring. A ¼″ pipe with a T at the top, extended to the base where it was drawn tight with a nut.

In the accompanying photograph will also be seen a floor lamp ready to be assembled, together with a few other typical wood turning projects made of varying designs by the freshmen boys in our high school. Boys have found it quite profitable to build and sell these lamps and in many cases modified their own designs to suit these wishing to purchase their product.

A DRAWING TABLE.

I. F. Mueller, South Milwaukee, Wis.

This adjustable drawing table is made of pine. The boys of the South Milwaukee Vocational School made eighteen of these tables last year, and they have been in constant use since May 30, 1919. The table is adjustable both ways, for height and tilt. The three-inch piece, fastened by a bolt and thumb nut to the bracket under the top, slides up and down in the frame. It is held in place by a ⅜″ bolt and thumb nut. The tilting top is held in place by two ⅜″ bolts and thumb nuts—equipped with two washers each to protect the wood.

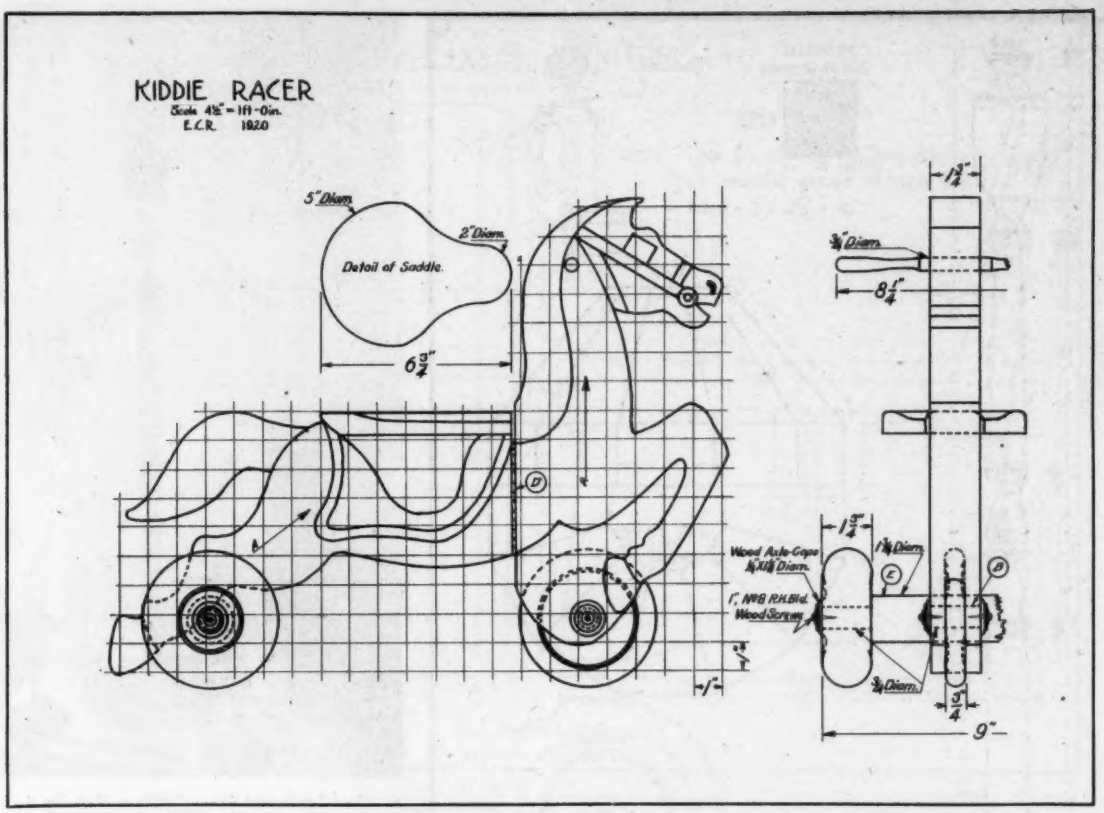
One surprising feature of this table is the wonderful rigidity with which the top is held in place—it takes a severe jolt to move the top when the thumb nuts are screwed tight. This is a tried table, and has stood the test for seven months.

A KIDDIE RACER.

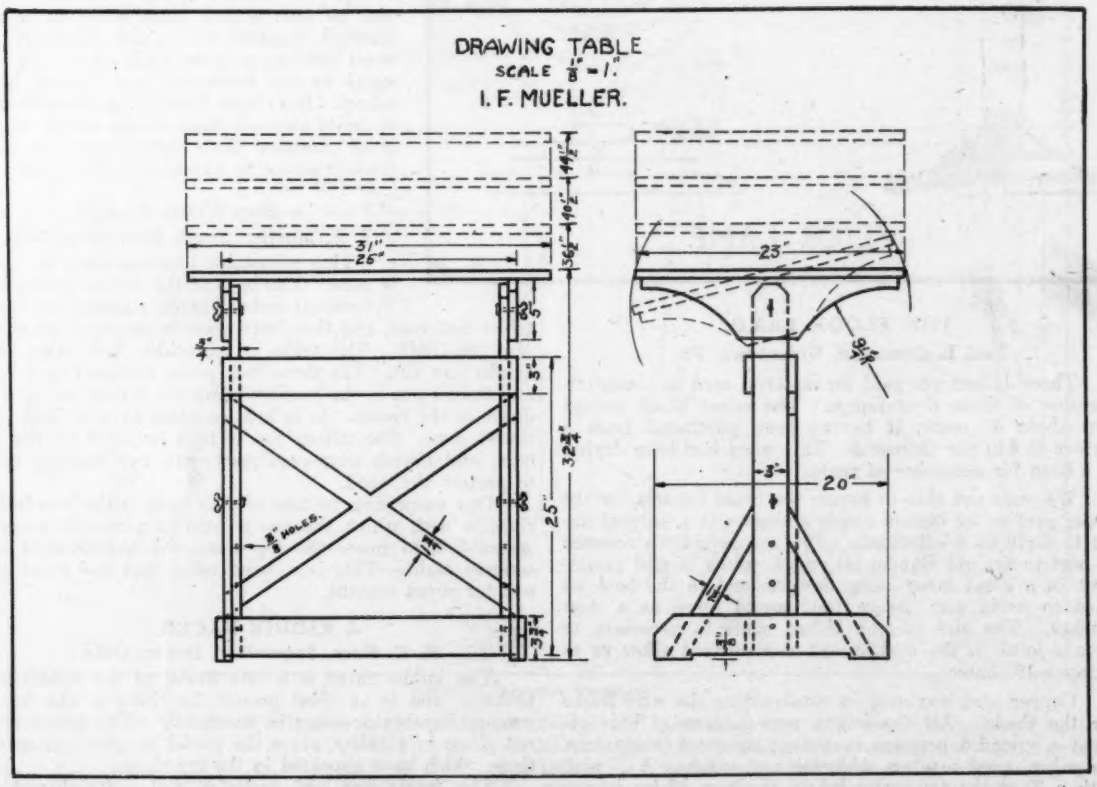
E. C. Rose, Supervisor, Dover, Ohio.

The kiddie racer is a late model of the kiddie kar problem, and is an ideal project for the boy who has a younger brother or sister in the family. The writer does not claim originality, since the model is quite similar to those which have appeared in the toy shops.

The design has been modified and the construction simplified so as to bring the problem within the ability of



Details of Child's "Racer"



Details of Drawing Table.

the average student. The problem is more suitable for the students who have access to woodworking machines, since the cutting to the irregular outlines is much easier if done on the band-saw, and the wheels, axles, and handle bar may be made much truer if the work is done on the woodturning lathe.

The handle bar, the axle B, the rear axle E and the axle-caps should be made from some close-grained hardwood. The forepart of the horse is joined to the rear part by means of two 1¼ inch screen hinges, D. This arrangement allows the forepart to swing from side to side, which is the means of steering the racer. The arrows A indicate the direction in which the grain of the wood should run to insure the maximum strength.

It is worth while to allow the pupil to help decide his color scheme, but the following is offered as a suggestion: The body of the horse, white; mane, tail, hoofs, bridle, and saddle, black; the blanket, some bright color with a black border; the rims of the wheels, white; the centers, black; and the axle-caps the same color as the blanket.

NOW, ARE THERE ANY QUESTIONS?

This department is intended for subscribers who have problems which trouble them. The editors will reply to questions, which they feel they can answer, and to other questions they will obtain replies from competent authorities. Letters must invariably be signed with full name of inquirer. All questions are numbered in the order of their receipt. If an answer is desired by mail, a stamped envelope should be enclosed. The privilege of printing any reply is reserved. Address, Industrial-Arts Magazine, Milwaukee, Wis.

Miscellaneous Texts.

47. Q:—I desire a bibliography of books on the growing and manufacture of tobacco, automobile repair work and vulcanizing, the chemistry of rubber and a description of the rubber industry.—*J. G. H.*

A:—Information on each of these subjects may be obtained by consulting the following texts:

Tobacco Culture and Manufacture.

Bull's Tobacco Growing, University of Minnesota Agricultural Experiment Station; *Ellett and Grissom's Preparation of Nicotine Extracts on the Farm*, Virginia Agricultural Experiment Station, Blacksburg; *Garner's Tobacco Culture*, $0.25, U. S. Department of Agriculture; *Goodspeed's Notes on the Germination of Tobacco Seed*, $0.25, University of California; *Mathewson's Culture of Flu-Cured Tobacco*, $0.10, U. S. Department of Agriculture; *Reinhart's Steam Sterilization of Seed Beds*, $0.05, U. S. Department of Agriculture; *Garner's Control of the Tobacco Wilt*, $0.05, U. S. Department of Agriculture; *Report on Philippine Tobacco Industry in the United States*, Bureau of Internal Revenue, Philippine Isl.; *Tanner's Tobacco From Grower to Smoker*, $0.75, Isaac Pitman & Sons, New York City; *Cigar and Tobacco Manufacture*, U. S. Immigration Commission, 1907-10, $0.70, Supt. of Documents, Washington, D. C.; *Werner's Textbook on Tobacco*, $1.50, Tobacco Leaf Publishing Co., 86 Beaver St., New York; *Killebrew's Tobacco Crop by Types and Districts*, Circular No. 27, 1912, $0.05, Supt. of Documents, Washington, D. C.

Automobile Repair and Vulcanizing.

Bates and Haynes's Automobile Upkeep and Repair, Ser. No. 60, Feb., 1919, Rehabilitation Monographs, Federal Board of Vocational Education; *MacCoul's Engine Repairing*, Ser. No. 35, Feb., 1919, Federal Board for Vocational Education; *Page's Automobile Repairing Made Easy*, $3, N. W. Henley Publishing Co., New York; *Swingle and Tarantons' Automobile Catechism and Repair Manual*, $1.25, F. J. Drake Co., Chicago; *Smoyer's Automobile Repairing Simplified*, $3, Tiernan-Dart Printing Co., Kansas City, Mo.; *Williams' Automobile Repairman's Helper*, $2.50, U. P. C. Book Co., New York; *Hall's Automobile Construction and Repair*, $2.50, American Technical Society, Chicago; *Hale's Automobile Troubles and Remedies*, $0.50, Saalfield Publ. Co., Akron O.; *Root's Automobile Troubles and How to Remedy Them*, $1, Stanton & Van Vliet Co., Chicago; *Dunham's Automobile Welding*, $1, N. W. Henley Co., New York City; *Tufford's Tire Repairing and Vulcanizing*, $1.75, Dunwoody Institute, Minneapolis, Minn.

Rubber.

Handbook of Chemistry and Physics, $2, Chemical Rubber Co., Cleveland, O.; *Porritt's Chemistry of Rubber*, $0.75, D. Van Nostrand Co., New York City; *Potts's Chemistry of Rubber Industry*, $2, D. Van Nostrand Co., New York City; *Dubosc and Luttringer's Rubber: Its Production, Chemistry and Synthesis*, $6.50, J. B. Lippincott Co., Philadelphia; *Goodrich's Wonder Book of Rubber*, B. F. Goodrich Co., Akron, O.; *The Rubber Industry, Census of Manufactures*, U. S. Bureau of the Census; *Brown's Rubber: Its Sources, Cultivation and Preparation*, $2, D. Van Nostrand Co.; *Woodruff's Rubber Industry of the Amazon*, $5.50, G. E. Stechert Co., New York City.

A Leather Trouble.

52. Q.—I have a large leather covered chair that has a tendency of sticking to clothing, especially if a person is warm. Is there some dressing that I can apply that will stop this?

A.—Much of the trouble of sticky leather can be obviated by washing with a mild soap, like ivory, and then cold water. On some leathers follow with an application of a very small amount of liquid furniture wax rubbed briskly to a perfect polish. Or, give the chair two very light coats of shellac, diluted with an equal amount of alcohol.

Ornamental Stone Manufacture.

62. Q:—Will you kindly inform me where there are any books on artificial stone and white ornamental stone manufacture?—*G. L. F.*

A:—*Manual of Reinforced Concrete and Cement Block Construction*, $2.50, D. Van Nostrand Co., New York; *Beery's Cement Sidewalk Construction*, $0.50, Building Age Book Dept., New York; *Concrete Building Block and Brick*, Portland Cement Association, Chicago; *Concrete Stone Manufacture*, $1.50, Concrete-Cement Age, Publ. Co., Detroit, Mich.; *Concrete Floors and Sidewalks*, $0.50, N. W. Henley Co., New York; *Wheatley's Ornamental Cement Work*, $2, D. Van Nostrand Co., New York; *Alvarez's Physical Properties of Magnesium Cement Mortars of Various Proportions*, $0.40, University of California, Berkeley, Calif.; *Palliser's Modern Cement Sidewalk Construction*, $0.50, Industrial Book Co., New York City; *Rice's Cement-Block Manufacture*, $2, John Wiley, New York; *March & Dunn's Manual of Reinforced Concrete and Concrete-Block Construction*, $2.50, D. Van Nostrand Co., New York; *Palliser's Practical Concrete-Block Manufacture*, $0.50, Industrial Book Co., New York; *Newberry's Concrete Building Blocks*, $0.10, Portland Cement Association, Chicago.

Glue Troubles.

71. Q.—We have been using water-proof cabinet glue in our regular cabinet work, such as dowel joints, mortise and tenon joints, and rubbed joints, with unsatisfactory results. Most of our lumber is dressed three-fourths inch thick. It works fairly satisfactory with softer woods such as pine, gum and fir, but with harder woods such as birch and oak, the joints will not stand. On the oak we find it discolors the wood greatly even when surplus glue is washed away. In mixing the glue we are using Dover beater and let it stand half an hour before applying. Have also tried varying the proportion of water.—*L. R. S.*

A.—So-called water-proof cabinet glue is an impracticable material to use for ordinary cabinet work. It was primarily designed for laminating material in aeroplane construction, where three and five ply veneers are used to build up the fuselage. Because of the strains to which this material is subjected while passing thru cloud strata, it must necessarily be highly resistant to water. Because of its albuminous content it cannot be used on high grade furniture, since it readily forms colored compounds with the iron and other salts commonly occurring in water drawn thru any system of water piping. It is this condition which the correspondent has found as the cause of the discoloration of his woodwork when washing away the glue from a joint.

If he will write to Peter Cooper Company, Gowanda, N. Y., and ask them to submit samples of a high grade cabinet glue stock in flake or granulated form to be free from all traces of grease, to be sweet and neutral, to be non-foaming and to be manufactured from high grade hide stock, he will find that they can supply him with very satisfactory material at a reasonable price.

Glue either granulated or in flakes should be soaked in twice its weight of cold water until it shall have absorbed enough to become soft but firm when all extra water should be poured off. It should then be brought quickly to a boil in some form of double heater so as to prevent scorching. It should be allowed to boil gently for one-half hour and used immediately.

Care should always be taken to chill glue remaining in the pot as soon as possible since slow heat for a few hours will cause 50 to 100 per cent depreciation in the tensile strength of a good glue. In other words a 60-cent glue, boiled for four or five hours seldom has the strength of a 10 or 12-cent glue.

The amount of water to be used in glue work varies somewhat according to the type of wood being used. For instance, birch, beech, maple and oak demand that the wood be warm or even hot and that a heavy bodied glue be employed, while for pine, basswood, chestnut or cypress a medium body is best. It is my suggestion, therefore, that the correspondent completely abandon this special glue and substitute therefor a good material from a high-grade manufacturer of animal glue.—*Ralph G. Waring.*

Architectural Drawing.

74. Q.—I have a boy whom I desire to start in architectural drawing. Can you direct me to a text or plates that will be suitable.—*J. O. S.*

A.—*Seaman's Progressive Steps in Architectural Drawing*, $1.25, Manual Arts Press, Peoria, Ill.; *Windoes & Campbell's Architectural Drawing for Secondary Schools*, Webb Publishing Co., St. Paul, Minn.; *Greenberg & Howe's Architectural Drafting*, John Wiley & Sons, New York City.

Mechanical Drawing.

57. Q:—I am not a teacher of mechanical drawing but I want to give my boys here a few lessons so that they will know how to read drawings. There is one point that I have not been able to find in my text book on mechanical drawing that I would like you to clear up for me. Is it good practice to square the left and lower edges of the drawing board and use the T square against the lower edge to draw vertical lines, when there are quite a number of vertical lines, or they are longer than the triangles?—*H. L. P.*

A:—This question has apparently been suggested by information in French & Svenson's latest book on mechanical drawing for high schools. These authors say in the first chapter, "The drawing board must have left hand and lower edge very straight and accurately square with each other as these are the working edges." Further on they say that all vertical lines should be drawn with triangles against the T square. Just why the lower edge should be squared and straight they do not state.

It is not considered good practice either by teachers of drawing or commercial draftsmen to use the T square for vertical lines even if the draftsman's board is square. The shifting of the T square from the vertical to horizontal position is objectionable and consumes time. A man can work more rapidly by using the T square for horizontal lines and triangles for vertical lines even if this operation requires shifting of triangles for long lines.

It may well be asked, if the student is permitted to draw from the lower edge of his board, what rule can the teacher give him for not drawing from the upper edge as well? Of course, we know that one can rip a board with a cross-cut saw, but good practice requires the use of a rip-saw. Likewise a draftsman can draw vertical lines with a T square, but it is not the correct method.

While most drawing boards have an edge strip glued or nailed on the left hand side so as to retain a straight edge, it is quite difficult to keep this strip accurately square with the other edges of the board.—*George Ellison.*

Wax Polishes.

73. Q.—I desire a formula for a wax polish and for original finish on new furniture. I have tried making a wax finish by melting beeswax in a double boiler with two-thirds its bulk of turpentine and applying it while hot. Later I rubbed across the grain to rub any surplus off, but this did not give me a satisfactory finish. Can a wax finish be made in that way? If so, wherein was my mistake?—*J. F. C.*

A.—This correspondent has made a mistake in attempting to get a wax polish with beeswax as ordinarily obtainable on the market. Before it is possible to use it as a polishing material it must be further refined in order to completely remove all traces of honey and other sugars which occur in very appreciable percentage in ordinary commercial beeswax. I would suggest that in place of attempting to make homemade waxing material from turpentine and beeswax that he buy Butcher's Old English wax, which to my knowledge, is the most carefully made material on the market today, since it is a combination of several waxes properly refined, which is hard enough to produce a lasting, satisfactory polish. No material is so unsatisfactory to make at home as a polishing wax. The writer hesitates to answer the question for "an original wax finish on new furniture" because it is too indefinite to afford a proper understanding of what the correspondent desires to accomplish. If this could be explained a little more fully perhaps help could be offered.—*Ralph G. Waring.*

NEW BOOKS

Bricklaying in Modern Practice.

By Stewart Scrimshaw, Supervisor of Apprenticeship for the State of Wisconsin. Cloth, 182 pages. The Macmillan Company, New York.

This book is another evidence of the tremendous strides being made in bringing the service of the educator-mechanic to the aid of the industrial efficiency of the nation. The author initiates the apprentice into an ancient art thru the medium of practical studies, equips him with the fundamentals of an important occupation, and trains him in the modern methods of bricklaying.

The book is more than a text. It is rather a handbook, which the apprentice should study to get the history, the theory, the economics and the social significance of the craft, while he is learning the elements and is acquiring skill and experience "on the job." To be sure the materials of the trade, the tools and apparatus, the practical processes, the special phases of brick construction, safety and hygiene, are amply dealt with. The several chapters are provided with illustrations of designs, processes and materials. Each chapter is followed by a summary, a series of questions and a list of the more exhaustive literature on special phases of the art. As a whole it is a concise, practical and modern textbook on the subject.

Household Arithmetic.

By Katharine F. Ball and Miriam E. West. Cloth, 271 pages. J. B. Lippincott Co., Philadelphia.

This book is more than an arithmetic made up of problems based upon household situations. It is rather a textbook of household science and practice with the economic and mathematical factors strongly emphasized thru arithmetical problems. The book is divided into six sections: Budgets and accounts, shelter, operation, clothing, food, higher life. The several topics are introduced with brief, comprehensive suggestions and definitions and illustrated by a group of problems that require a complete understanding of the practical phases of the topic. Just here the authors have shown fine discrimination in limiting themselves to the potential experiences of girls in high schools.

The chief value of the book, as we see it, is three-fold: (a) If taught intelligently it will give a facility in the solution of household problems that involve figures; (b) It will cause girls to think about their home problems in economic terms, and (c) It will motivate the secondary school instruction in a field that has been sadly neglected.

Industrial Education in the Public Schools of Altoona, Pa. Prepared under the direction of G. D. Whitney, director of vocational education. Altoona is an industrial city and the needs of the thousands of shop workers in this district have been taken into consideration in prescribing the course of study for the industrial education department. All courses, both day and evening, are conducted under the provisions of the state plan for vocational education. In the high school, trade training is given in connection with the regular courses and the last three years are devoted to specialized trade training. The courses include machine shop practice, plumbing, sheet metal work, printing, cabinet making and machine drafting. In the grades, manual training is offered in the two upper grades and comprises drawing and wood shop work. In the seventh grade an attempt is made to develop a healthy attitude toward the standards for regular commercial work and to have a wholesome respect for work.